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PROCEEDINGS AND TRANSACTIONS

OF THE

Queensland Branch

OF THE

ROYAL GEOGRAPHICAL SOCIETY

OF

AUSTRALASIA.

6th SESSION,
1890-91.

EDITED UNDER THE AUTHORITY OF THE COUNCIL OF THE SOCIETY,
BY

J. P. THOMSON, F.R.S.G.S., ETC., ETC.,
Hon. Secretary and Treasurer;
Honorary Corresponding Member of the Société de Géographie Commerciale de Paris, the Société de Géographie de Marseille, the Royal Scottish and the Manchester Geographical Societies.

The Authors of Papers are alone responsible for the opinions expressed therein.

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NOTICE.

All Donations presented to the Queensland Branch of the Society are acknowledged by letter and in the printed Proceedings of the Society.

N.B.—All communications to the Society should be addressed as follows:—

HON. SECRETARY AND TREASURER,

ROYAL GEOGRAPHICAL SOCIETY OF AUSTRALASIA,

BRISBANE, QUEENSLAND, AUSTRALIA.

FIRST ORDINARY MEETING.

Sixth Session.

The first ordinary monthly meeting of the sixth session of the Royal Geographical Society of Australasia, Queensland Branch, was held in the Museum Library, Brisbane, on the evening of Friday, August 22, 1890, at 8 o'clock. J. N. Waugh, M.D., M.R.C.S., etc., occupied the chair.

Elections.—Life Members, Messrs. J. Mathieson and W. Taylor, JJ.P.; Ordinary Members, Messrs. J. Philp, J.P., A. J. Rolfe, and J. L. Irving.

The author read the following paper, illustrated by photographic views :—

Notes on The New Hebrides.

By Douglas Rannie, Esq.

As far back as the year 1606, part of the New Hebrides Group was discovered by the Spanish navigator, Don Quiros. Later, these islands were visited by Torres, Bougainville, and Captain Cook; but not till very recently have they been properly surveyed and their positions definitely fixed on the Admiralty charts. During the last fifty years European traders have settled from time to time among the islands, have made fortunes, and gone away again. And for over forty years the missionaries have been carrying on their work, with such success you may judge, when I may safely assert that, with but few exceptions, were Don Quiros, Captain Cook, or any of the old navigators to revisit the scenes of their former explorations, they would see no difference to-day in the natives from those of 1606 and 1770; yet the thousands of pounds spent annually on this group alone ought surely to show some better results. Were the history of European settlement in the New Hebrides to be written, it would be a fearful chapter of horrors and bloody atrocities.

During the six years that I have been cruising among these islands, the massacres of white men have been something appalling, in spite of the numerous French and British men-of-war cruising there, and the fifteen Presbyterian missionaries stationed in the group. Occasionally, short reports are to be seen in the daily press from the few chance visitors who make a fleeting trip among the islands. They are, as a rule, interesting, but then they are merely superficial, as casual visitors have not the time to pick up much information about the islands, nor yet can they study the ways and habits of the natives, unless they come in personal contact with them and visit them in their native state.

Sailing from Australia, and after having passed New Caledonia and the Loyalty Group, the first island you come to, and the most southerly of the New Hebrides, is the island of Anatom or Gam (spelt and pronounced by the missionaries Aneiteum). Anatom or Gam is quite different in formation and appearance to all the other islands in the group. It is of basaltic formation, and is devoid of that tropical appearance peculiar to the other islands. The soil is of a red clay, and is only fertile on one part of the island. There is one large and good harbour—Analgawhat by name—the port of call at present for the A.U.S.N. Co.'s steamers bound to Fiji. A saw-mill was started here about three years ago, and is doing fairly well. On the opposite side of the island there is a small but good harbour—Port Patrick (N. side). On the west side there is a good anchorage in S.E. winds named Annawunsi. Here two Europeans are settled, engaged in the copra trade. I was informed at the beginning of this year that a timber-getter, employed by the saw-mill, while engaged at his work up in the mountains, picked up specimens of stone showing indications of gold, and that he had gone to Sydney to have his specimens assayed.

In earlier times Anatom gave promise of a more brilliant future than it has proved to-day. Forty-five years ago Captain Paden founded a settlement with saw-mills and workshops at Analgawhat, and settled sandalwood getters all over Erromango

and Tanna, and carried on a large trade with China, making Anatom his head-quarters. But the sandalwood got worked out, and the white men left. Twenty years later came the Underwoods family. They took to boat-building, and engaged in the whale fishing. They proved very successful, and left in a few years to pursue other vocations in more civilised countries. The next enterprise was The Glasgow New Hebrides Cotton Company, but it very soon succumbed for want of labour, the natives being too lazy to work on their own island. As to the natives, they are rapidly dying out. At one time they are said to have numbered thousands; now the whole population does not amount to nine hundred. This rapid decrease may be attributed to the very foolish custom insisted on by the missionaries, *i.e.*, that all natives must wear European clothing—a practice which has caused more disease and death among the South Sea Islanders than any other known cause. With European clothes on, the natives will move about in a broiling sun, become saturated with perspiration, go home, and, without removing their clothes, sleep in that state the whole of the night. Such a practice brings on all sorts of pulmonary complaints, not to speak of the horrible sores arising from their keeping the same clothes on from day to day without undressing, causing the clothes verily to rot on their backs. Why not let them have calico lava-lavas or loin cloths, leaving their fine brown and weather-beaten backs and chests bare, as nature intended they should be. The natives, on my first visit to Anatom, reminded me of when I was younger seeing some American Indians on the Hudson River. I had read something and heard more of the "noble red man;" but when I came into actual contact with them, all the romance evaporated, for there they were, worse looking than the poorest tramps of the old country, dressed in the poorest of cast-off European attire.

About forty miles from Anatom, to the N.W., is Futuna, the most out-of-the-way and most seldom visited island in the group, and here the Rev. Dr. William Gunn has been stationed where he can do the least possible good, and he is the only medical

missionary in the whole group. Futuna is a very small island, resembling Gibraltar without the mainland behind it. The natives are much lighter in complexion than most of the other islanders. They wear their hair tied in a queue, and hanging down the back. Dr. Gunn informed me that they talk the language of the Maoris of New Zealand. There is only one anchorage on the N.W end of the island, and that is a bad one. What little soil there is appears to be fertile. Fowls are in great abundance, and are sold for very little. The population numbers about 500. About thirty miles to the N.W. of Futuna is the small island of Aniwa, with a population of about 200. They are all supposed to be Christians; but I am afraid the only object of their worship is the missionary who supplies them with goods, and not the God who created them. Aniwa is a low-lying island, and not worthy of note.

About 15 miles to the westward of Aniwa is the island of Tanna, a small island only 18 miles long by 15 miles broad, with a population of about 8,000 or 10,000. There are at present two white missionaries, and two white settlers engaged in the copra trade; but their influence seems to be of but little good, as the natives are treacherous and very warlike. Almost every man among them continually carries a rifle with him. The first night I spent in the New Hebrides was in Weasisi Anchorage, in Tanna. We were lying there in company with a schooner and a cutter. In the middle of the night I heard the banging of rifles, and, going to make enquiries in the morning, I was informed that a canoe had come alongside the cutter, and shot the captain through the head while he was lying reading in a hammock on deck. In the Sangalu district, I have known of nine white men growing cotton, all about the same time: six of them were killed, viz., Captain Dgett, Ross Lewyn, two brothers named Bell, Morrison, and Underwood, while the other three were driven away by the treachery of the natives. Cotton, in any case, would not and did not thrive here, as the young plants were often choked by the dust and cinders which fall from the ever-active volcano. At the south-east end of Tanna there

existed some time ago a very fine harbour named Port Resolution, so named by Captain Cook, who had his vessel hove down there for the purpose of scraping her. The ring bolts to which he hove the ship down were visible till a very recent date; but about ten years ago there was such an upheaval that the sea bottom rose about 60 or 70 feet above sea level, thus blocking up the mouth of the harbour, and Captain Cook's ring bolts mysteriously disappeared. That part so upheaved is now covered with dense scrub. In appearance the natives of Tanna resemble those of Futuna, but are, as a rule, of a much more muscular build. On one part of the island they talk the same language, and their costume is the same all over. The women wear long grass dresses, and the peculiar swing they give their bustle gives them a very jaunty style of walk. I was informed by one missionary there, that there are thirteen different languages spoken in the island, but I fancy they must be dialects of one language. There is a continual state of war over the island; the tribes are never at peace, and I suppose they never will be, till they about exterminate one another. They are the most warlike islanders in the group, and they are at the same time the most superstitious. They believe only in evil spirits, and all solitary places or holes in the rocks are haunted by them. I tried to find out from them their idea of the origin of man; and I have been informed by many that man came from underneath the world, which is a great place of fire, and arrived on earth from the volcano in the island; that the mouth of the volcano is one of the doors to this region of fire; also, that man's spirit at death returns by the same fiery gateway, and ever after the spirits of the dead have free entrance and exit to and from the fiery regions, and they are constantly returning to work evil on earth.

Their belief in magic is profound; and all refuse from their food is carefully buried or burnt, and the ashes buried. For instance, the skins of bananas, or the refuse from the sugar cane after they have chewed it, are all gathered up and destroyed or put out of sight. This is done lest some of their enemies should

find some of the refuse from their food, and with this same refuse they might work a spell, so as to make the part eaten disagree with the person who has eaten it, and so bring about his or her death. Some believe they can cause the sun to shine so powerfully on the heads of the people of another district as to cause great sickness. According to their belief, no man dies from natural causes. All deaths are brought about by magic, or spells worked by some other individual, and that is the cause of most of the fighting. They also believe greatly in the power they have to make wind and rain; but this belief is general all over the islands. As an illustration of this idea, I had a very amusing conference with a large crowd of Tannese. It was at the time when so much was said about the annexation of the New Hebrides. The natives asked me if the French had landed on some of the islands to the north; I said they had. They then asked me if the French would land on Tanna. I informed them that the French might do so, but I could not say. "Ah, there are plenty Tanna men," they replied; "and we have all got rifles, and we will shoot the Frenchmen as they land." "Yes," I said, "but if the French come in such numbers that they will be able to beat you, what then?" "Ah, then," they replied, "we will make such a fearful hurricane that all their ships will be lost." And they fully believed that they could do so. Christianity has made very little progress, and I believe the missionaries have had a hard time of it;" and I was very much astonished to see in some copies of a missionary's letters to Mr. Gladstone, the Secretary of State for the Colonies, and others, that large numbers of the Tannese had embraced Christianity—"they were serving Jesus," "and they loved the name of Queen Victoria," "and were pleading for British annexation." Now, with all due reverence to our most gracious sovereign, if you were to ask in all Tanna who Queen Victoria is, I believe that no more than five individuals out of the eight or ten thousand could say they ever heard of her. And I have asked many near the mission stations who Jesus is, but they could not tell me. When I asked them if they did not know who Jesus Christ is,

they answered that "Jesus Christ" were bad words used by sailor men when they were angry. The Tannese are very cunning and wily, and are great flatterers, just to serve their own ends. To an Englishman they say they hate the French, and to the Frenchman they say they hate the English, and *vice versâ;* and they have no idea of what the annexation of their island means.

About twenty-five miles to the north of Tanna, we arrived at Erromango, an island thirty miles long, by twenty broad. This island has a very black history, both in the annals of Christian Mission and of trade and commerce. Captain Cook in early times, found the natives of this island to be the most treacherous he had met with. He gave his name to a bay on the east side where his boats were attacked by the natives, and the high-land above it, he named Traitor's Head. On the west side is Dillon's Bay, into which runs the Williams River, where the Rev. John Williams, the first martyr missionary, here fell a victim to the clubs of the savages of Erromango. He was followed by five others, among them the two Gordons, brothers, and Mrs. Gordon. The natives have told me how they murdered Mr. and Mrs. Gordon in 1875. They were living in a house they had built on the hillside above the Williams River. Mr. Gordon was down superintending some work close to the sea-shore, when some natives came down and told him that his wife wanted him up at the house. He at once started for home, and while walking along the pathway, he was tomahawked from behind. The natives then went up and tomahawked Mrs. Gordon on the verandah of the mission house. Long before this, when Captain Paden's sandal-wood getters were stationed all over the island, frequent conflicts took place between the natives and the white men, resulting in great loss of life on both sides. No one will ever know the number, or the names of the white traders who fell and died at Erromango. The natives now are wonderfully changed for the better; but still, the present missionary does not feel at all safe. The soil everywhere is very rich and prolific, and well adapted for the growth of all sorts of tropical produce.

My friend the Rev. H. A. Robertson, missionary there, has taken me round and shown me cotton, coffee, arrowroot, tapioca, sago, maize, sugar-cane, and tropical fruits of many kinds growing in great luxuriance. Some years ago, a cotton plantation was started in Elizabeth Bay, a few miles to the north of Dillon's Bay, by Messrs. Smith and Gray. They also engaged in whaling. Gray died there, and the plantation was given up as well as the whaling industry. Mr. Robertson showed me a small house, which in past years had been used for storing sandal-wood, under the management of Mr. Glisson; and he informed me that through that house alone, had passed sandal-wood to the value of £160,000. At the present time there is no trader nor settler, except the missionary, on the island; yet it is a most attractive country for settlers. The mountains to the summits are clothed with splendid grass, well suited for grazing purposes; while the valleys are well adapted for sugar growing. The population of the island at one time must have been large, but the natives are now rapidly dying out, and do not at the present time number 2,000. The island is bountifully supplied with fresh water, as fine large streams run in all directions. Fine timbers exist in abundance, and large quantities of sandal-wood can still be got all over the mountains. Fish also abound in the streams. And some time ago the Rev. Mr. Robertson let loose a number of pea-fowl, for the future benefit of the sporting friends who come to visit him; and from all accounts I believe the pea-fowl are multiplying rapidly. There are four good anchorages on the island; Dillon's Bay and Elizabeth Bay on the west side, Cook Bay on the east side, and Polenia Bay on the north-east side.

The next island in our course as we steer northward, is Efaté or Sandwich. This island is better known to the general public than any other in the group, as it is most frequently visited, and has the largest population of white settlers. In Havanah Harbour, the principle harbour in the island, there are two stores, where one can purchase almost anything; one store is owned by an Englishman, and one by a Frenchman. There is also a Mission Station here with a Scotch missionary. In Villa Harbour

there is a large white population; quite a heterogeneous gathering of all nationalities, who have made an attempt to form themselves into a republic, and have elected over themselves a president. Their principle occupation is planting maize and coffee; and they seem to be in a thriving condition. On the eastern slopes above Havanah Harbour, there is a flourishing coffee plantation which was started by the late Mr. Glisson. In 1886, the French Government sent down a detachment of troops to Havanah Harbour, which caused some excitement in Australia, as will be remembered; but the troops were only too glad to leave again in the early part of 1888. The first white settlers in Efaté or Sandwich, were McLeod and Trueman; McLeod shot Trueman, and some time afterwards, McLeod shot himself in Villa Harbour. Next to them came the three brothers Eblewhite. They started trading on a larger scale than has ever been before or since carried on in these islands. They were engaged in planting, sandal-wood getting, timber dressing, and cocoa-nut oil crushing. The old natives about tell me that Havanah Harbour looked at one time like a thriving township, but the three Eblewhite brothers died, and were buried there, and with them their thriving young settlement collapsed. The ruins of their houses are still to be seen, and the iron machinery of their sawmills and workshops, still litters the ground. Then came the early days of the Labour Trade; and Havanah Harbour was the rendezvous for the labour ships of all nationalities, and became the scene of many fearful acts of lawlessness, when the savage instincts of the white man were let loose under the influence of liquor, and the smell of gunpowder. There is a large cemetery dotted here and there with crosses, some erect, but most half fallen or wholly fallen down. Many of those who lie beneath have succumbed to fever; but most have met with violent deaths, either by the hands of the natives or that of their fellow white men. The island is very unhealthy for white men; and few if any, have resided there who have not been attacked with fever. The natives on the whole are quiet and harmless, although all carry weapons about with them. The population of Sandwich is about two or three thousand.

Near to Sandwich, and almost connected with it by land, is the island of Moona, with a population of about six or seven hundred. A fair proportion of them follow in the faith of a missionary who has been stationed there for upwards of ten years. Some articles of his faith I must acknowledge are peculiar; for instance, he told me himself that he instilled into them the belief that to go on board a trading or labour vessel, is a mortal sin; and to go to Queensland, Fiji, or New Caledonia, is particular damnation; and he makes them take a solemn vow never to emigrate to a foreign land, before he will admit them into his Christian church; because he says, in going away from their own island, they break the 5th commandment of Moses, and leave their parents in their old age. The greater proportion of the natives are confirmed heathen, and will hold no communication with the missionary; in fact, I was sorry to see the manner in which they ridiculed him when I mentioned the missionary to them. The island stands 1,500 feet high; on the top it is surmounted with a long coarse grass, while the shores of the island are clothed to the water's edge with a thick scrub. The handsomest church in the group is built here, and was paid for by the natives with arrowroot.

Close to Moona is the Island of Mau. Its population is estimated to be about the same as Moona, *i.e.*, six or seven hundred. They are quiet and peaceable now; but this good result is not due to missionary influence, but to the salutary lesson given them by a man-of-war recently. A number of them were engaged on board a trading vessel; and when at Tanna, they rose and killed all hands except the mate, whom they kept alive and made him navigate the vessel to Mau; but on their arrival there, they murdered the mate, looted the vessel, and then set fire to her.

Besides Moona and Mau, Sandwich has a number of smaller adjacent islands hardly worthy of mention.

Leaving Sandwich, we enter a small group of islands, named collectively, the Shepherd Islands. The first of any note and size is Mai, about 26 miles from Sandwich. Mai stands about

1,850 feet high, is 8 miles long, by 3 in breadth; and it has a population of about 500. When I first visited Mai in 1884, the natives were wild and warlike. On going amongst them on that occasion, each man looked gloomy and serious; every one was armed with a rifle, and all had one eye blackened with plumbago, a sign amongst them of death. Close to them was a man bound hand and foot, and made fast to a tree; and from the tree dangled a rope by which they were going to hang him. They were going to kill him they said after the manner of white men. He was guilty of having eloped with the young chief's wife. I remained a long time with them trying to buy the unhappy wretch off. But all my afforts were in vain; although most of the men were willing to accept the presents I offered, and let the culprit go with me; but the young chief was obstinate, and fearing I think, that I might attempt a rescue, he gave an order, and half-a-dozen savages stepped out with their rifles, and shot the unlucky lover of the chief's wife dead, before me. When I visited the island in 1886, I could not recognise in the miserable objects dressed in old European clothing, the fine stalwart savages I saw in 1884. One change I was pleased to see in them, was the absence of rifles and other offensive weapons. They said they had become missionary men; and they had taken to the manufacture of copra and arrowroot. Since then, I believe they have made a great deal of copra and arrowroot, and with the proceeds, have bought several boats. They have native missionary teachers among them, and many are now able to read and write; and you will constantly hear them singing in their own language, hymns set to the airs of those of Moody and Sankey. It is a pity to think that having become so civilised, they will soon die off through the wearing of European clothing, as the natives of Anatom and Erromango have done, and are continuing to do. There is no fresh water on the island, yet the natives grow vegetables and English cabbages, the like of which I have never seen equalled in Australia. For moisture, the heavy dews which fall at night are depended on. Most of Mai has been sold and resold to quite a number of white men by the

natives; and I think the purchasers will have trouble before they can prove their right and title to the soil.

The largest and most important island among the Shepherd Islands is Tongoa, with a population of over 1,000. The natives of this island are physically the handsomest and most picturesque in the whole group. Their costume consists of a broad belt woven with coloured native grass, from which they drape their calico from behind in long folds, pass it between their legs, and hook it up again to their belt in front, which has the appearance of loose Turkish trousers at first. The leg is bare from above the knee downwards; below the knee they fix fancy worked garters, with bunches of dyed grasses of bright colour attached. Their hair is cut short all round the head, but a long top-knot is allowed to grow on the top, round which they bind some bright calico; and to render their head-gear a little more imposing, a few long feathers are often stuck in the top-knot. The Rev. Mr. Michelsen has been stationed here for upwards of ten years or more, and I have found him one of the most liberal minded and earnest missionaries it has been my fortune to meet with. He is now beginning to reap the fruits of his labour. At first he had much to contend with, and his life was in continual danger. Time after time the natives lay in ambush to murder him, but he always providentially escaped. He was driven from place to place before he could establish a station; but his bitterest enemy, a powerful chief, was killed in this way. In 1883 the Queensland schooner "Helena" anchored there to return some labourers, when the natives of Tongoa conspired with some return islanders, natives of Aoba, to take the ship and murder the white crew. But Captain McQuaker, getting wind of their plan, came on deck, revolver in hand, and shot the Tongoa chief dead, and his right hand adviser, who was with him. Then the ship's crew, both black and white, drove the Aoba men below hatches, and the Tongoa men over the side—and so perished the missionary's worst enemy. Next year I visited the island with Captain McQuaker, and while ashore ran a narrow escape of being shot. About the end of 1885, or

beginning of 1886, when the missionary was away for a holiday, the natives walked into his house, took out the native teacher he had left behind, and killed and cooked and ate him in the garden. They are inveterate cannibals, and Mr. Michelsen informs me that during his stay among them he has known of many to have been killed and eaten. Fortunately for me, I rendered the natives a service, which ever afterwards made them treat me with the greatest respect. Fortunately, I say, for in April, 1888, in the hurricane that swept over the islands then, I had the misfortune to be shipwrecked in the schooner "Madeline," and had to live with the natives seven days before we were picked up by a French vessel; and cannibals and savages though they be, nothing could exceed the kindness and consideration with which they treated us during our short stay among them; and while there I had many opportunities of witnessing their peculiar customs. Rising early on a Sunday morning, I determined to attend the Mission Church, and, after a tremendous climb up a mountain track, I arrived there just in time for service. After service, which was conducted in the usual order ordained by the Presbyterian Church, but in the native language, I stood at the door with the missionary, and shook hands with every individual one of the congregation, which numbered 130, after which we adjourned to the missionary's house, where I refreshed myself with the most delicious fruits. The view from the Mission Hill was superb. As I commenced my descent to the sea-shore in the evening, I thought the scene could not be surpassed. Below me 1,800 feet lay the wreck of our poor little craft, while the white canvas tents of our shipwrecked party shone out conspicuously from amidst the green bushes which fringed the sea-shore. Between the base of the mountain on which I stood and the sea stretched a beautiful plain, dotted here and there with graceful cocoanut and ivory-nut palms, banyan, and other spreading trees of shade. The sea, like burnished gold in the setting sun, was studded here and there with little gems of islets, while far beyond, the blue mountains of Api and Ambrym melted away in the shadowy distance. A glimpse of this small group of

islands in a brilliant sunset is one of the most lovely sights in the New Hebrides. Besides Mai and Tongoa, there are among the Shepherd's Islands Mataso, Makura, Tongariki, Ouflair, and Ahwoisy, all inhabited, and a number of other little rocks and islets, which are very beautiful, but they render navigation rather difficult

The next island we visit is Api, which is about 25 miles long by 13 broad, with a population of seven or eight thousand. Of Europeans there is one missionary and about half-a-dozen white traders. The whites are all engaged in the copra trade, and, all things considered, get on fairly well with the natives. The island is well watered with flowing streams, and is very fertile, as the soil is extremely rich. Tin and silver are said to exist on the island, but as yet the interior of the island has not been prospected. The natives here as usual are savage and bloodthirsty, and many tales may be told of their savage cruelty. It was on this island that Mr. Steadman, Queensland Government Agent, and both his boats' crews were massacred a short time ago. The mode of attack adopted then by the natives was most treacherous. They pretended to be on very friendly terms with the party. Two natives stood alongside each of Steadman's men, while one engaged Steadman in conversation. The native talking to Steadman casually asked to have a look at Steadman's rifle. All the natives were now on the alert. Steadman innocently handed the fellow the rifle, who immediately asked if the rifle was loaded. He received a reply in the affirmative. He then suddenly cocked the rifle, and, putting it to Steadman's head, blew his brains out with his own gun. This was the signal for general attack, and the tomahawks of the natives came down as one, crashing through the skulls of the two boats' crews. Only one managed to escape with his life, but fearfully wounded. If the natives were more severely punished by our men-of-war, these outrages would be fewer and less frequent. But the commanders of the men-of-war are not allowed to use their own discretion and punish the natives, knowing that they are guilty, but must wait for orders, and by the time they receive those

orders the old outrage is forgotten by the natives, and a new one perpetrated. All along the coast are very good anchorages. Among those best known may be mentioned Diamond Bay, Nelson Bay, Foulard Anchorage, and Yemyn Cove. The shore on the lee side of the island is of coral sand in some places, and black sand in others, and from this side the land recedes in fine gradual slopes, till it terminates in the mountain peaks which rise boldly from the sea on the weather side, attaining heights of 1,800, 2,500, and 2,800 feet. The island is all densely wooded, even to the mountain tops, and only here and there can be seen the light green patches cleared by the natives for the cultivation of their yams, taro, and other vegetables. It is only of very recent times that any trading has been carried on here, and that is still on a very limited scale.

From Api we pass to Paama, a small island 6 miles long by 3 broad, and 1,900 feet in height, with a population of nearly 1,000. They are very fierce, and no white man has ever been able to settle on the island. They are divided into two tribes, and are constantly at war with one another. Only a few months ago a poor fellow named Coster was upset in his boat, and drifted on to the coast of Paama; he was immediately seized, killed, and cooked and eaten. Wild and savage though they be, I must give them credit for the manner in which they cultivate their soil. They have about the finest yam plantations and banana groves in the whole group. A peculiarity a stranger will at once notice on visiting this island is the large number of albinos to be met with, but they are most wretched objects to look at. They are of a sickly white colour, their eyes are pink, and their hair, which is the best part of them, is of a fine golden tinge. On one of my last visits there, a man and wife, who were very dark themselves, brought me twins, both albinos, and the parents were very proud of their offspring. I may mention here that the birth of twins is a very rare occurrence among South Sea Islanders.

To the eastward of Paama stands Lopevi, only six miles in circumference, but attaining a height of 5,000 feet, with an

active volcano on the top. Lopevi is of a perfectly conical shape, and the lava has run down on all sides, only leaving a fringe of green vegetation round the base. It can only support a small population of about 100.

To the north of Paama and Lopevi we come to Ambrym, 21 miles by 18. Ambrym has several active volcanoes. They have broken out within the last year, when the great volcano Mt. Marum burned out. The bursting out of the new volcanoes caused a large loss of life, and the ashes thrown up from them smothered several villages. The whole of the interior of the island is a desert of volcanic ashes, and no vegetation grows there. Mount Marum, the old volcano, stands about 3,500 feet high. The inhabited portion of the island, which runs all round the sea coast and extends to a distance of about seven or eight miles inland, is very rich and fertile. Numerous springs of hot water are found along the coast, the water of which, when bottled up and kept till cold, on being opened effervesces similar to any aerated water. The anchorages on the island have no shelter, but the holding ground is good. The principal anchorages are Craig's Cove, Dip Point, Rhanone, and Rood's Anchorage. As in Api, there are half-a-dozen or so copra traders, all in a small way, and they have all settled on the island very recently. The native population amounts to about 10,000 or more, and they are all very savage and hostile to white men. The murders of white men in Ambrym have of late been very numerous—too numerous for me to name, but of British subjects lately murdered I may mention Captain Belbin, George Craig, Joseph Booth, Harry Bowen, and Edward Heath, besides a great many Frenchmen. They were all killed at different times; Belbin and Heath were shot with rifles, Craig was done to death with thirteen spear wounds in his body, while Booth and Bowen were both poisoned. The natives of Ambrym are notorious poisoners. Most of their poison is of the vegetable order, and they administer it to their victims in the most subtle manner. I have seen pigs and fowls bought from the natives so dosed with poison that they have died in an hour's time after being bought.

They also inject poisonous matter into the yams and taro they sell, and in a recent case, which proved fatal, the young cocoanuts used for drinking were poisoned by digging the point of a poisoned arrow into the soft eye of the green cocoa-nut, allowing the milk of the cocoanut to dissolve the poison on the arrow. When the arrow or any sharp-pointed instrument is withdrawn from the eye of the green cocoanut, the pith closes up, leaving no mark of the incision. The natives of Ambrym are inferior in physique and personal appearance to those of the Shepherd Islands and the south, but are similar to the natives of Api, whom we have mentioned, and those of Mallicolo, to whom we come next.

Mallicolo lies to the eastward of Ambrym, and is the largest island we have come to so far. It is 50 miles long by about 25 across at its widest part. For the size of the island the population is small, not numbering more, I believe, than eight or ten thousand. The general aspect of the island is for the most part hilly, but fine fertile valleys are very numerous, and fresh water rivers abound everywhere. The mouths of those rivers or streams are generally brackish lagoons, surrounded by mangrove swamps; but from half a mile to a mile inland, fresh water of the very best is always to be found. Mallicolo has many good anchorages and harbours and safe shelter from the many hurricanes which periodically visit the group, the best of which is Port Sandwich, at the S.E. end of the island. This is a large harbour, about four miles long by two in breadth, capable of accommodating a very large fleet. To the south of Port Sandwich a good shelter is to be found in the Maskelynes, a group of small islets on the coast. To the westward, again, of the Maskelynes is Leonora Harbour, quite safe from any wind or sea. To the north, again, of Port Sandwich, on the east coast, is Port Stanley, another famous anchorage and hurricane harbour. At the south-west end of the island will be found South-West Bay, also a good anchorage, but not safe from a N.W. wind. From South-West Bay a narrow inlet leads into a large inland lake of brackish water, which extends for eight or ten miles. In this lake fish abound in great shoals, and oysters are also very

plentiful. In all the lagoons in Mallicolo fish are caught in large quantities. When I visited Port Sandwich first, which is now the principal port in the islands north of Havannah Harbour, there were no white settlers; but since then the French New Hebrides Company has made Port Sandwich its headquarters, and when the French Government sent troops to the islands, they stationed the largest detachment here; but the troops, as I before stated, were recalled in the early part of 1888. The natives were glad to see the last of the soldiers, and the soldiers were not sorry to go. The French New Hebrides Company here is in a rapid decline. It has paid large salaries to both Englishmen and Frenchmen, but all its efforts to carry on trading have been sad failures. Most of those to whom it paid big salaries gained the experience and the money, and have now started for themselves. The only thing the Company is rich in is land, but how the title to the land claimed is to be proved will be a puzzle. More acreage is claimed, I believe, in the New Hebrides than could be obtained if the islands were all rolled flat. The murder of Frenchmen in the islands is very common, and I am never astonished when I hear of this one and that one being shot or tomahawked by the natives. Besides the French Company's store in Port Sandwich, there is an English one; but they only carry on an indifferent trade with passing ships.

On the islands of Wallah and Ranan, at the N.E. end of Mallicolo, two Englishmen are settled as traders, and they seem to get on well with the natives, and, from all accounts and appearances, one of them is in a fair way to make quite a fortune in copra alone. Between Port Sandwich and the north end, three Scotch Presbyterian missionaries are settled, but their settlement there has been too recent to have as yet in any way affected the natives for the better. Only one of them has been so far molested, and him the natives wanted to shoot, but they only killed his servant. Since the settlement of the Presbyterian missionaries, two French Jesuit missionaries have come and started stations along the coast, which they visit periodically.

To the north of Mallicolo, and separated from that island by the Bougainville Straits, is the island of Malo or St. Bartholomew, 12 miles long by 9 broad, with a population of about 600, which is rapidly decreasing through syphilitic diseases, introduced many years ago by whalers who then visited the group. The island rises in a gentle slope from the sea to a height in the centre of about 1,500 feet. A striking feature in the island is a deep fresh-water lake, which I visited, about four or five miles inland, out of which a fine stream of fresh water runs, passing through a second lake on its way to the sea. I managed to go all the way up in my boat, but after passing the first fresh-water lake, although the stream was wide and deep, we had to cut every foot of our way through the vines and creepers hanging from the gigantic trees which met overhead. On emerging from our tangled passage, we found ourselves in what appeared to be the crater of an extinct volcano, as the sides all round rose perpendicular from the water's edge to a height of sometimes 200, 300, and 400 feet. I had a twenty-five fathom sounding line with me, but could not get bottom at that; I then bent on the boat's painter, which gave other five fathoms, but could not get bottom at even thirty fathoms. The lake is quite circular in shape, and is not more than 300 yards across. A Presbyterian missionary has been settled on Malo for upwards of three years, but he complains that his progress has been slow. Close to Malo, on the little island of Tonoa, is situated another mission of the Presbyterian Church, and the most picturesque and beautiful mission station in the whole group. The houses are open to the sea on both sides; the extensive grounds around are covered with bright verdant grass and studded with gigantic forest trees, giving the place the resemblance of the park about some fine old English manor house.

To the north of Malo lie the islands of Aore and Setovi, only separated from Malo by the Malo Pass, from two to three miles in breadth. A very strong tide runs through the Pass, and has caused several ships to run on a reef which extends a considerable distance out in the water at the N.E. end of the Pass; but this

may easily be avoided by anchoring anywhere on the south side of the Pass, and the reef is always visible from the ship's deck. On the island of Aore, Mr. George de Lautour has been engaged for four or five years growing coffee and maize, and he has planted large tracts of cocoanut trees for future use. Mr. de Lautour has had trouble with the natives at various times, but his determined character, and his accuracy with the rifle, have taught them now to hold him in great respect and fear. One of his little peculiarities, which lends awe to the respect in which the natives hold him, is that he has both his gate-posts surmounted with a skull and cross-bones. Between Aore and Espiritu Santo runs the Segond Channel, which forms as fine a hurricane harbour as is to be found in the group.

We come now to Espiritu Santo, the largest island in the group, being 90 miles long by 50 in breadth, with a population of about 30,000. To Mr. Edward Downs, of Townsville, I am indebted for a deal of information about Espiritu Santo, or Santo *minus* Espiritu, as it is more commonly called. Mr. Downs was for over three months travelling all over Santo, and, in the beginning of 1885, I picked him up there, and accompanied him on a gold prospecting trip to the Solomon Islands. Although I visited Santo before Mr. Downs, and have been there several times since, I never have had the opportunity which he has had of visiting the tribes in the interior, and he informs me that by far the greater proportion of the large population live in the interior, and seldom if ever visit the sea coast. The natives of this island with whom I have become acquainted are of the worst type. They have been contaminated by coming in contact with the so-called "labour ships" of Samoa, but which were nothing but kidnappers pure and simple, and Santo was their best hunting ground. Through the depredations of these Samoan slavers, many a honest white man has met his death. All along the sea coast on the eastern side are lagoons and rivers, at the mouths of which vessels can find snug anchorages; but all along here the natives are wild and treacherous, and are all well armed with good rifles and plenty of ammunition, and the vessels hailing

from Noumea are not altogether free from blame in supplying the natives illegally with firearms and liquors. A regular chain of small islands runs most of the way along the east coast, forming a natural protection to the mainland. and vessels can sail all the way between the small islands and the mainland. On the north-east coast the anchorages are Hog Harbour, Port Olry, and St. Philip's or St. James' Bay, or, as it is called most frequently, Big Bay. Big Bay is about seventeen miles long by twelve in width. Several good anchorages will be found about the head of Big Bay. Here the Jordan River runs into the sea --so named by Don Quiros in 1,606 A.D., when he founded the New Jerusalem, the remains of which old settlement are said to be still standing, but I cannot say I have seen those ruins, although I have gone a good way up the Jordan River. Far inland the natives talk of a race of small men or pigmies, who live in the fastnesses of the mountains, who never hold communication with the other natives, but who come down often and plunder the gardens and plantations of those who cultivate the soil. Those pigmies, they say, never cultivate anything for themselves. The natives of Santo cultivate tobacco largely, and on the west coast I found a tribe who manufacture all sorts of culinary utensils and others from pottery-ware, and they are the only natives in the New Hebrides who make such articles. Among the other islanders you will sometimes find vessels made from wood; but the most common and universal system of cooking anything that is not roasted is to roll the food to be cooked up in plantain leaves, and then put it on the fire. There is a large, distinct tribe of natives near Hog Harbour and Port Olry, and they are the tallest men in the group, but they are very fierce and treacherous. They are very courageous while fighting with the other natives, but if a white man faces them on their own soil, their courage fails them, and they become the rankest of cowards.

There has lately been started, in the Segond Channel, a coffee plantation. It is the largest enterprise which the French New Hebrides Company has as yet engaged in. The soil on all parts of

Santo is very fertile and well watered. The mountains are high, reaching to heights of 4,000 and 5,000 feet, and clothed to the summits with luxuriant vegetation. There are also fine plains and valleys, very rich in fruits and native produce, while the forest land abounds in magnificent timber. But Mr. Edward Downs, of Townsville, in his able articles published in the public press some time ago, describes more faithfully and more fully than I can do at present the beauties and natural wealth of Espiritu Santo.

Sailing to the eastward some thirty miles or so, we come to Aoba. Seen from the sea, this island appears the garden of the group. Terrace after terrace of beautiful native gardens rise from the sea coast to the tops of the rolling hills beyond. Here a plantation of yams and there a plantation of taro, and again a grove of banana trees all laid off in squares, like the beds in a vegetable garden; while here and there spread great trees of shade, and the whole is filled up with thousands of graceful cocoanut palms. Aoba has a native population of ten or twelve thousand, and they are quite a distinct race from the natives of any other island in the group. They are of light complexion—so light, in fact, that when Captain Cook saw them at a distance he thought they were lepers, and called the island Lepers Island. But they are far from being lepers, and are the most cleanly in habits of all the islanders I have met with. They come down in large crowds to the sea every morning to bathe and wash the mats they sleep on, and also those they wear round their loins. They approach in features sometimes to the natives of Fatuna, and many proper names and words are exactly similar. They have a still closer resemblance to the natives of the Torres Group, both in features and in language, as also to the natives of the little island of Tucopia, away to the N.E. of the Banks Group. Going ashore, one is always struck with the cleanliness of the native villages, and with how fallen leaves are always carefully broomed away. Great taste is also exhibited in planting flowers and bright foliaged crotons around the houses. The men are handsome and good-looking, and the women are

pretty and tasteful. These women are in great demand among settlers through the group, for housekeepers and general servants. But for all that can be said of the natives of Aoba, it must be confessed that they are the most incorrigible cannibals to be met with. I had the pleasure once of attending a great feast, at which there must have been upwards of 5,000 natives; and there I saw several human bodies being cooked on the fires. I have travelled a good deal about the interior of the island alone with the natives, and have never seen anything approaching to treachery among them; but white settlers along the coast say they are never to be trusted and are very treacherous. There are at the present time six traders settled on Aoba—one Scotch, two English, two French, and one American. The American has been there longest, and does the biggest trade with the natives; but just now he is not on good terms with them, as they have killed two of his labourers, and he means to have revenge. He has a number of Tannese working for him, and they all keep watch at night for a night attack. The other traders are all engaged in the copra trade, but they are all complaining of dull times. The cocoanuts are hard to get, and the copra when made as hard to dispose of to a good market. The island is 18 miles long and 10 in breadth, and rises in a gradual slope from all sides to a height of 4,000 feet. There are about half-a-dozen good anchorages on the lee side of the island, but no harbours.

About ten miles to the eastward of Aoba lies the island of Pentecost, a high mountainous island 35 miles long by 6 across, with a population of about 3,000. Minerals are said to exist on this island, but all I have seen was galena and plumbago or wold, and that was shown me by a trader who had visited the island in his cutter. The mountains rise almost perpendicular from the sea, and are very rugged; but yet the soil must be rich, as it is very prolific, and fruit and vegetables are always to be had in abundance. The natives are very treacherous, and fight a great deal among themselves; and when an opportunity offers itself, they are not averse to taking the lives of any white men

who may come in their way. I have known two white men killed there. One, Mr. Brown, of the Queensland schooner "May Queen," was decoyed away to a quiet place and treacherously murdered. The other, Mr. Lee Walker, while trading with them in firearms and ammunition, was murdered for the sake of the articles he had for barter. On one occasion, when I called in to the principal harbour, Battenhapney, I could see no one, except the bodies of some return islanders lying dead upon the shingle, who had just been landed by a Queensland vessel and murdered by their own countrymen. There are several anchorages along the coast, the two best being Battenhapney and Toadstool Bay. One of the Melanesian Mission stations is situated at the north end of the island, and on my last visit there the Mission people were at war with their neighbours. All along the coast of Pentecost are fine streams of water running down to the sea, and springs of hot water abound at the south end. Separated from Pentecost by a narrow channel of water is the island of Maibo or Aurora, very similar to Pentecost in appearance. It is 30 miles long by 6 in breadth, and has a small and scattered population not amounting, I should guess, to over 1,500. Both islands are remarkable by the absence of cocoanut trees. And a strange coincidence I have noticed in all islands abundantly supplied with fresh water—there is always a want of cocoanut trees; and *vice versâ*, in islands where there is a scarcity of water, the cocoanut groves spread all over. In Maibo, the most perfect system of agriculture I have yet seen in the South Sea Islands is carried on. Last year, while anchored at Double Waterfall, I had a good opportunity of visiting the native gardens and plantations. Accompanied by a friend, who went round the islands with me then, we went a long way up the stream, and there we found the natives had adopted a very perfect system of irrigation. We passed through a very large taro plantation. It was cut up into squares, every square being about five or six feet, and raised from the ground about one foot. The plantation being, of course, on the side of a hill, streams of water were conveyed from square to square by means of large

bamboos split up the centre, and forming perfect aqueducts. On going to the source of their water supply, we found the natives had made a channel by building a thick wall along the ledge of a steep cliff, thus leading the channel almost up to the base of the Great Waterfall; and thus they conducted the water along the ledge of a cliff some twenty or thirty feet above the natural channel of the main stream. There are several school-houses here, under the charge of the Melanesian Mission, and many of the natives make a profession of Christianity; but the natives at the south end of the island are very treacherous, and not to be trusted. There are two good anchorages on the west side of the island, viz., Double Waterfall and Narovo-rovo.

These are the islands, then, denoted the New Hebrides. Those a little to the northward come under the term of the Banks Group.

I am often asked many questions about the South Sea Islands, more especially about the New Hebrides—for instance, such questions as the following: "Is the population of the group on the increase or the decrease?" Well, it is very much on the decrease, as I have noticed from the many deserted villages and the many houses which have gone to wreck in villages which are partly inhabited. And again, in places where I have met the bushmen in hundreds I can only count a few tens now, and, on asking where the rest of the tribe is, I have always been told that nearly all are dead, or gone abroad to Queensland, Fiji, New Caledonia or Samoa, and some whole families have gone to the Sandwich Islands.

"What are the causes of this very rapid decrease?" I answer that, apart from the emigration of the few, the majority die from natural laziness, filthy habits, and syphilis, which are the primary causes of most pulmonary complaints, and from the vices of drink introduced by white men. The official report for last year (1889) shows that during that year alone 1,114 natives came to Queensland as labourers, but then a large proportion are annually returning, so that the emigration system has not much to do with the decrease in the population.

"Are the healthy natives physically strong?" Yes, they are strong; but they have not the endurance of white men. They cannot remain so long in the sun as white men, and they always keep as much as possible in the shade, but they are capable of standing any amount of sultry heat. I was once in charge of three boats, with nine white men and seven natives. We were pulling in those boats from six o'clock in the morning of one day till three o'clock in the morning of the next. We were in latitude 7° S., and the whole of that day we had a broiling sun and a dead calm; yet for all these hours the white men stuck to their oars, but before the sun had gone down the natives were all insensible in the bottom of the boats; but I should mention that we had no water in our boats to drink for the greater part of the time.

"Are they intelligent?" I have found them for the great part very intelligent, and very quick in picking up the ways of the white man. Languages they are very apt and quick in learning.

"What health do European settlers enjoy?" European settlers enjoy fairly good health throughout the group, as long as they abstain from spirituous drinks, most of the sickness among the traders arising from intemperance. Yet there are exceptional cases, where men settle down in unhealthy localities and neglect to clear a sufficient space around their dwellings of the dense scrub; and again in the case of young children, if they are not sent away to a colder climate while young, they grow up very weakly, and generally become very weak in the bone; but this is a fact common in all tropical countries.

"How would stock thrive on the islands?" From what I have seen, cattle, horses, and goats thrive wonderfully well, but sheep do not seem to get on at all. As for pigs, they abound in all the islands; and pork is the only animal food the natives can procure. In Erromango there is a fine table-land of many square miles, covered with a coarse grass, which the few cattle belonging to the missionary seem to enjoy and fatten well on; and again, in the island of Mallicolo there is fine grass country of great extent, capable of supporting thousands of cattle.

"Are the islands suitable for tropical agriculture, such as sugar-growing, &c.?" If the islands are good for anything at all, it is that of tropical agriculture. The soil in most places is deep and rich, and most of the islands have a bountiful supply of water. In some islands there is no water, such as Mai and others, but the natives depend on rain water and the heavy dews which fall at night, and in those islands even the native produce is as fine as that of any of the other islands; but the great majority of the islands have many running streams of beautiful water. Take the natural products of the islands as cultivated by them in their own crude way, and they are samples sufficient of the fertility of the soil. Take their yams alone, and in all the world you will not find yams to compare to them in quality nor size. It may seem almost incredulous, but I saw one yam which took four men to carry it. It was a prize yam, and was decorated with flowers. In many islands the natives hold agricultural shows, at which they exhibit yams, taro, flowers, and pigs, and it was at one of those shows I saw the enormous yam I mention. I was sorry at the time I had no means of ascertaining its exact weight. The natives grow sugar also in considerable quantities, and the valleys in many of the islands, such as Erromango, Mallicolo, Api, Santo, and Aurora, are admirably adapted for such an industry. Coffee is now extensively grown, as is also maize. Arrowroot and tapioca grow wild everywhere. The natives have groves of oranges, lemons, and bananas on every island, and now are growing melons, pumpkins, cucumbers, tomatoes, onions, spinach, and English cabbage in large quantities, while the European settlers grow a much greater variety of vegetables and fruits. Among the fruits they have introduced are peaches, passion fruit, granadillas, custard apples, cape gooseberry, pomegranates, grapes and figs. Among other articles of commerce to be cultivated in the group I may mention cotton, candle nut, ivory nut and saffron. There are three other different species of nuts growing wild in the scrub, two of them of very fine flavour. The one resembles an almond in flavour; it is called by the natives all over the islands the nangi nut. The

second resembles a hazel nut in flavour, but not in appearance. The third is very like the chestnut, and is very fine when cooked.

That the time is not far distant when these islands will have a large white population, I am certain; and ultimately, I believe, they will be entirely populated by the white race. When that time arrives, the New Hebrides will be one of the fairest quarters on the face of the globe, as it is at present even in its wild, uncivilised state. Where, except in the land of your birth and the scenes of your childhood's home, can you picture anything so fair and beautiful as this group of islands, where mountain top on mountain top rise on one another and dissolve themselves in the heavens, where the innumerable gems of emerald isles stud the azure sea, where the gentle rise and fall of the water on the coral strands seems to sing a soft lullaby to inanimate nature, "where everything is beautiful, and only man is vile?"

The CHAIRMAN and the HON. SECRETARY of the Society commented in favourable terms upon Mr. Rannie's paper, after which the proceedings terminated.

SECOND ORDINARY MEETING.

Sixth Session.

The second ordinary monthly meeting of the sixth session of the Royal Geographical Society of Australasia, Queensland Branch, was held in the Museum Library, Brisbane, on the evening of Friday, October 10, 1890, at 8 o'clock. Mr. R. Gailey, J.P., occupied the chair.

Elections.—Honorary Corresponding Members, H. R. Mill, D.Sc., F.R.S.E., F.R.S.G.S., Edinburgh, and S. P. Smith, F.R.G.S., Wellington, New Zealand. Ordinary Members, Messrs. W. Watson, F. Strüver, C. C. Riley, J.J.P., and J. G. Cunningham.

Mr. A. J. Boyd read a paper, entitled:—

Ocean Currents,

of which the subjoined is an abstract.

The first portion of the paper was devoted to a description of stream and drift currents, and to a discussion on the causes, reasons, and results of the ocean's state of constant unrest. The origin of currents so far as is known was explained, and also several theories concerning their origin were examined and discussed. The direction of the more important currents was pointed out, as also the reasons for their so flowing. The many perplexing currents of the South Sea Islands were attributed to the stupendous architectural labours of the corallines. The more important currents were then taken and discussed in detail. The Gulf Stream was followed from its inception to its final broadening out over thousands of square miles, and the disappearance of a portion of it amongst the icy regions of the North Pole. Various theories concerning its origin were given, as also the arguments against those theories. A contrast was drawn between the ice-bound land of Labrador and the smiling

plains and hills of North-Western Europe, due to the warmth carried to those regions by the Gulf Stream. The next current dealt with was the great equatorial current of the Atlantic, the writer following its course from Africa to South America, and, leaving the branch which flows north into the Gulf of Mexico, described the southern branch or Brazil current, and gave an account of the Sargasso Sea and its formation, showing how a portion of the Gulf Stream returning towards the Equator gives rise to a vast whirlpool with a circumference of 11,000 miles, within which the sea of weed is found, and always will be found so long as the two great currents fulfil their task. The existence of submarine currents and their discovery by different experiments was treated of, as well as the polar currents and counter currents. The vast influx of Atlantic water into the Mediterranean through the Straits of Gibraltar, and the velocity with which it sometimes runs, were exemplified by stories of the days when steam was scarcely used, and vessels lay current and wind bound for weeks at a time inside the Straits. Proofs, so often disputed, of an under current running out of the Mediterranean through the Straits, were then adduced. It was next shown that the great body of the Antarctic Ocean makes a majestic advance towards the Equator, and gives an impulse to the Peruvian, or Humboldt's current, which in its turn gives the first impetus to the equatorial current of the Pacific. The analogy between this latter current and the Gulf Stream of the Atlantic was clearly shown. The great equatorial current of the Pacific was followed, and its division into north and south equatorial by a warm counter current explained. It was traced to the Philippine Islands, and then to Japan, where it receives the name of Kuro Sivo, or Black Stream of Japan, and finally to Kamschatka, Behring Strait, and to California. Other currents were touched on, especially those of the Australian coast, ocean and connecting currents, and the paper concluded with a sketch of voyages made by bottles thrown out experimentally from vessels sailing through the great currents.

The paper was accompanied by two charts, one showing the

ocean currents, and the other descriptive of the method adopted by the American scientists in the discovery of a disabled vessel.

Captain W. Thomson initiated an interesting discussion concerning Australian ocean currents, in which the Chairman, Messrs. C. B. Lethem, W. Castles, E. G. Edelfelt, and the Hon. Secretary took part.

After Captain Thomson had exhibited an ancient book of African travel, the meeting closed.

THIRD ORDINARY MEETING.

Sixth Session.

The third ordinary monthly meeting of the sixth session of the Royal Geographical Society of Australasia, Queensland Branch, was held in the Museum Library, Brisbane, on the evening of Monday, November 24, 1890, at 8 o'clock. J. N. Waugh, M.D., M.R.C.S., &c., occupied the chair.

The following paper, illustrated by maps, was read by the author:—

On the North-East Coast of British New Guinea, and some of the adjacent Islands.

By J. P. Thomson, F.R.S.G.S., &c., &c.,

Hon. Secretary and Treasurer of the Royal Geographical Society of Australasia, Brisbane.

The north-east coast of the British Possession in Papua extends from East Cape to Mitre Rock, where the Anglo-German demarcation boundary is defined by the 8th parallel of south latitude. Adjacent to this sea-board are several islands and groups of islets that also belong to the British; some of these lie close to the mainland shores, while others, such for instance as the Nada (Lauchlan Islands), Murua (Woodlark Islands), and Trobriand Groups, are located far away to the northward and north-eastward. It is upon these, and upon the geographic conditions of the adjacent coast of the mainland, we propose to descant.

Previous to the establishment of British power in Papua, nothing useful was known of this part of our possession—less, indeed, than of other equally accessible regions—owing, no doubt, in great measure to its geographic position, which makes it inconvenient to the trading ports of Northern Queensland, as compared

with the southern and south-western coast on either side of Port Moresby. It was supposed to offer no tempting inducements for commercial enterprise; the native inhabitants thereof were regarded as notorious anthropophagi, the coastal waters were known to conceal many dangerous reefs, shoals, and rocks, and the inhospitable aspect of the shores extended no alluring invitation to approach them. The hills and mountain ranges, when viewed from afar, appeared to rise abruptly from the sea-shore, leaving no extensive areas of lowlands, and presenting no favourable inducements to settlement upon their rugged and precipitous faces, while no harbours or ports of refuge were known to exist, the indentations known as Goodenough, Collingwood, Dyke, Acland, and Holnicote Bays being too open and exposed to the north-east wind and sea to afford safe retreat in rough and unsettled weather. Viewed from a geographic standpoint, we cannot therefore regard otherwise than with very great satisfaction, coupled with our sense of gratitude to the Administrator himself, the results of the inspection of this coast and some of the adjacent islands by the Government of the Possession during the end of July, 1890. By these we are now for the first time made acquainted reliably with the ethnography of the natives inhabiting this part of the Papuan territory. We now also for the first time know that Mount Victory possesses great internal activity, and that for maritime enterprise this north-eastern coast offers greater facilities than elsewhere in the Possession, as indicated by the discovery of several secure harbours and anchorages in places where formerly itinerary data showed none, and hypothetic evidence discredited their possible existence. More than these, we have succeeded in initiating ourselves into the good graces of the savage tribes, showing them, very probably also for the first time, the good instead of the bad phases of European character, which may inspire, but not divide. We have restored to some of them weapons and other ethnological objects, which ill-advised hands had robbed them of, and, by other equitable acts and imitable examples, the national character has been vindicated, and their feelings of resentment and hatred

have given place to those of love and admiration, in itself no little achievement for either governments or individuals to have accomplished.

On the coast-line the Anglo-German boundary is defined by Mitre Rock, supposed to be located, by a singular coincidence, upon or near to the aforesaid 8th parallel of south latitude, and within a quarter of a mile of the shores of Boundary Cape, so named by the late Major-General Sir Peter Scratchley from the position it occupies in defining the limit of the spheres of German and British influence in that part of the Papuan territory. This huge conglomerate mass, bearing the name of Mitre Rock, projects 60 feet above the surface of the water; its base, which is also about 60 feet in diameter, has an opening of about 12 feet in height and a yard in breadth, extending right through the entire block in the direction of north and south. The top of this most prominent and distinctive landmark is covered by bushes and small trees. About half the size of this remarkable feature, and located a short distance to its southward, stands a bold, pyramidal mass, upon which the name of Craig's Pillar was bestowed by Sir William MacGregor, as a mark of respect to the second officer of the "Merrie England." About half-a-mile farther south a small harbour was discovered, with water of from three to fourteen fathoms in depth; to this indentation the name of Douglas Harbour was given, after the second engineer of the Government steamer aforesaid. In general character, Boundary Cape is composed of low, forest-clad hills, from 400 to 500 feet above the sea, of metamorphic rock. No native villages were observed in this immediate neighbourhood, and the first indications of occupation were met with to the south of Caution Point, where a powerful tribe inhabits a large coastal village. Both here and in Holnicote Bay the natives were friendly disposed, and both men, women, and children approached the expedition without fear or distrust. With some the hair of the men was worn in matted ringlets, or in the form of great mops. They decorated their heads with the feathers of the cassowary, shells, and fibre, and in their ears rings of cocoa-

nut and turtle shells were worn. They were ignorant of the use of iron, and could not be induced to exchange their weapons for any European article offered. These weapons consisted of spears, adzes of jade and of basalt, and clubs, also of basalt. They did not appear to practise tatooing, but the men ornamented their chins with false whiskers, extending from ear to ear. This custom was regarded as somewhat remarkable, from the well-known fact that in other known parts of British Papua the growth of hair upon the face is discouraged. The largest tribe met with on this coast was that inhabiting the lowlands south of Boundary Cape. The women wore net corsets, inwoven with *coix lachryma jobi*, and the men were clothed with "sihis" of coloured native cloth. The district they inhabit is physically composed of hilly ground and sago swamps, with a fringe of flat land along the sea-shore, clothed by casuarina, mangroves, and forest trees, while the whole is backed by an extensive area of undulating country, extending towards the outliers of the Great Owen Stanley Range. Upon one of the low hills in the neighbourhood of this large village a site for an Anglican mission station was chosen. Notwithstanding that no apparent intercourse had previously been held by Europeans with these people, they were decidedly pacific, and the terms upon which they parted with the expedition were felicitous, although the language they spoke was not understood. At first they did not know the use of iron, nor were they subsequently anxious to procure it. They were neither demonstrative nor suspicious, although at times when inspecting their European visitors their numbers were not less than 500. The impression they left upon His Honour the Administrator was decidedly a favourable one, and, if dealt with in a proper manner, they will very probably be of some use to the Government of the country or to private enterprise in territorial settlement.

The bottom of Dyke Acland Bay is occupied by the group of villages known as Oro. The country upon which these are locatel is flanked by the Hydrographer's Range, which extends its broken, high, forest and grass covered ridges to the sea-shore,

and whose elevated spurs are inhabited by a native population of probably 3,000, who live in villages scattered over the mountain slopes, in some places in the midst of small groves of the cocoa-nut palms. The country upon the southern aspect of this bay is of a very poor character, being low, wet, and thinly populated, the characteristic timber being casuarina, mangroves, and forest trees. Upon the ridges overlooking Oro Bay, a site was also chosen for an Anglican mission station, which, with that formerly mentioned, will doubtless in time develop into important centres of organised effort, being surrounded by a populous country, apparently healthy, which is now a virgin field for evangelical labour. In general appearance the Oro natives resemble those met with in Collingwood Bay, their dress and ornaments being almost similar, excepting in the case of some of the *men*, who wore corsets of network, inwoven with Job's tears. In this respect they differed from their more northerly neighbours, whose *women*, as before stated, were clothed with a similar garment. Some bore indications of marks tatooed upon the face, but this distinguishing feature, indifferently executed, was not general. Some doubt existed as to whether Oro is the tribal name by which these people are generally known, the appellation having been first used by the local guide, who shouted, "Oro kaivara enao" when approaching them. The eastern flank of Dyke Acland Bay is occupied by Cape Nelson, a prominent headland, upon which is situated Mounts Trafalgar and Victory, with their spurs shooting out to the sea-shore, where fringing reefs protect them from the angry billows of the ocean, which at times are furious; when tossed to and fro by stormy winds, they fall upon the coral-bound shore with mighty, crashing sounds. The coast-line of this cape is interesting and picturesque, being remarkable for its numerous indentations, which are separated from one another by grass-covered, conglomerate ridges, rising abruptly to probably 150 feet, their projecting ends being fringed by mangroves. Some of these inlets are perfect havens of refuge to shipping, especially Maclaren Harbour and Port Hennessy, so named by the Administrator. A large population appeared to

occupy the country at and in the neighbourhood of Cape Nelson. Some of the natives met with were engaged fishing in canoes on and around the projecting reefs of the cape. At first these were shy, but after overtures of a pacific nature had been made to them, confidence was established, and distrust quickly gave place to cordial friendship. Although anxious to procure beads and red cloth, they were perfectly indifferent to the use of iron, and evinced no desire to obtain knives, even after their use had been practically demonstrated to them. Their elaborate head-dresses consisted chiefly of the feathers of the cassowary and ground shells, curved across the head from ear to ear; their ear and nose ornaments were made of marine shells and tortoise-shell, and their breasts were plated with pigs' tusks. Their villages were some distance inland, and their plantations appeared to be located chiefly on the slopes of the low spurs of Mount Trafalgar. It was when in the neighbourhood of Keppel Point that Sir William MacGregor first discovered the seismic character of Mount Victory. Steam was first observed in the early morning issuing from the summit of its two crests, and from a ridge of lower altitude; as the morning advanced the whole top of the mountain was completely obscured by the dense exhalations, which resembled a thundercloud. The altitude of Mount Victory is probably 3,500 feet above the sea, and that of Mount Trafalgar about 4,000 feet. The latter is forested to its summit; upon the former vegetation is not luxuriant, it being very precipitous, its top occupied by bare, rocky masses, and its rugged faces contorted by what appeared to be enormous landslips. Sharp shocks of earthquakes were reported to have been experienced some weeks previously by fishermen in the neighbourhood of Sydney Islands, while on the mainland similar phenomena were also observed at Port Moresby, but on no visible part of the mountain could lava streams be detected.

Collingwood Bay is a large, exposed indentation, bounded on its eastern aspect by Cape Sebiribiri (Cape Vogel), and overlooked by Hornby Range, Mounts Suckling and Dayman. Its south-western waters are obstructed by numerous shoals and coral

patches, which constantly menace navigation. Little shelter is afforded by this bay, excepting that of an unimportant indentation, to which the name of Phillips Harbour was given, in honour of the "Merrie England's" chief engineer. This is situated approximately in latitude 9° 30′ south, and longitude 149° 13′ east; its water ranges from eight to fourteen fathoms in depth. From this place to Keppel Point the coast-line of the bay is occupied by the Maisina tribe, who live in villages scattered along the sea-shore. The country between the ranges and the sea-shore is flat, and densely covered by forest and vegetation, the casuarina variety being conspicuous. The intervening country between Mounts Victory and Suckling for about twenty to thirty miles in extent is also low and thickly wooded. The village dwelling-houses are of an inferior order; they are built just large enough to accommodate one family; the roofs project on one side from the walls to within about three feet from the surface of the ground, so as to form a veranda; beneath this a platform was constructed for resting upon and for family use generally. These small dwellings were supplemented by a large club house, from end to end of which a platform extended for general use as a sleeping place; this style appeared to be in general use in this part of the Possession. The people salute by touching the nose and navel. The general practice of destroying the eyebrows is to cut them off, instead of resorting to the usual method obtaining in other parts of the territory of pulling them out by the roots. They consume the betel-nut, but the limespoons dedicated to its use are very inferior in design and in make. Some wore beards, and others wore their hair in long, matted ringlets; they also wore the usual ornaments met with in this part of the Possession. Their canoes, which measured about 40 feet in length, were made of one log of wood, with sharp ends, and about two-and-a-half feet in breadth, with very small outriggers projecting some distance from their sides. Of the use of tobacco and iron they were quite ignorant, and at several villages nothing would induce them to accept knives in exchange for their jade adzes. The practice of tatooing was not met with amongst these people, but

they ornamented themselves profusely with head-dresses of shells and feathers, earrings, armlets, strings of the small white cowrie shells, and dogs' teeth. and some of the women were habited with short petticoats of native cloth. Their dead are buried in the villages, the graves being ornamented by planted dracœnas and crotons. They maintained friendly relations with the Europeans, and on several occasions showed unmistakable marks of kindness.

The coast-line between Sydney Islands and the Mukawa district, in the neighbourhood of Kibirisi Point, is uninhabited, this section of the country being composed of undulations formed of coral, which occupy an area of probably 20 miles broad between the watershed range and the sea-shore. This tract gradually rises towards its western end, culminating opposite Sydney Islands at an altitude of probably 1,000 feet, where the surface assumes a more rocky character than that of the lower levels of this area. Sydney Islands are each a few acres in extent, being of coral formation, very low, covered with trees, and uninhabited. From Kibirisi Point, which consists of several grassy plateaux, terminating in the sea, and separated by deep, narrow gullies, to Cape Sebiribiri, the coast-line of the small intervening bay is occupied by the villages of Kápikápi, Kitora, Ginada, Ogerena, Inageto, and Ataiyo; these are backed by low mangrove and undulating grassy country. Two interesting features exist opposite Kápikápi, in the shape of huge masses of coral, each of probably 80 feet in height, being flat on the top with perpendicular faces; these are occupied by probably a dozen houses each. To gain access to these, wooden ladders are used, which can be removed when not required. These houses, which were stocked with spears, are apparently used for retreats when necessary. The houses on the shores of the bay were comparatively inferior, being built on piles, and having roofs so low that the interiors could not apparently be kept free from wet. The people were very friendly, being neither over shy nor demonstratively forward.

The subject of our discourse upon the north-east coast of the Possession concludes with Goodenough Bay, a hook-shaped

indentation between East Cape and Cape Sebiribiri. Its eastern arm comprises Ansell's Peninsula, a district rendered notorious by its horrid associations in connection with the massacre of Captain Ansell and the destruction of the "Star of Peace" in 1888. The country at the head of this bay is interesting for the number of miniature plateaux, elevated probably 800 feet above sea level, of which it is chiefly composed; these picturesque areas are simply washed-down deposits from mountain ravines. The coast range, which is probably 3,000 feet above the sea, trends towards the direction of north-west, its mountains and peaks being precipitous, rugged, and unclothed by forest mantle.

Cape Sebiribiri is a broad, projecting point of undulating, wooded country, with no features of remarkable character to which special attention may be given. Judged by the general appearance of its native inhabitants, the climate of this part of the Possession is probably healthy. The apparent absence, however, of navigable watercourses is greatly against settlement on land that may probably be available for that purpose back from the coast-line.

The Trobriand, Murua (Woodlark), and Nada (Lauchlan) Islands are situated far away to the north and north-east of East Cape, between the parallels of 8° 25′ and 9° 23′ south latitude and the meridians of 150° 30′ and 153° 40′ east longitude.

Nada is a group of islets of about nine in number, occupying the most easterly position, the whole forming an atoll, the lagoon of which is from seven to twelve fathoms deep. It is shaped like a horse-shoe, with the opening facing the west, and its value as a harbour is very considerable. The group is very low, the vegetation consisting of trees, cocoanut palms, and other less prominent forms. The soil is poor, which necessitates dependence to some extent by the natives upon the productions of the island of Murua, for which privilege they make payment to the people thereof. According to Mr. Tetzlaff, a resident trader of Nada, the natives of the group number 169; these provide themselves with numerous canoes, in which their fishing and trading movements are conducted. The group is well supplied with fresh

water, and, being apparently healthy, the several islets are desirable places for settlement.

Murua Island, which lies west of Nada, possesses a good harbour on the southern aspect of its eastern end, the geographic position of which is in 9° 10′ south latitude and 152° 55′ east longitude. Longitudinally the island extends east and west for about 38 miles. This island was visited in July, 1890, by Sir William MacGregor, who examined Guasap Harbour, pronouncing favourably upon its natural advantages as a secure haven. The natives of Murua, who are of the usual Papuan type, are active and intelligent; they have entered the iron age, consequently stone implements were difficult to procure. Their arms consist of the spear, shield, tomahawk, and knife, the former being made of ebony, and the shield of a light, soft wood, painted white. Their food, which is in great abundance, consists of yams, taro, and sweet potatoes. During the years 1847–1852, the island of Murua was occupied by the Marists, who, in the midst of very great privations, and in the face of the most discouraging obstacles, laboured in the noble cause of Christianity, with self-sacrificing love and zeal to duty which more modern preachers might emulate with credit to themselves and advantage to the race.

To the north-west of Murua lie the Trobriand Islands, the largest of which is situated in latitude 8° 30′ south and longitude about 151° east. The whole group is of coral formation, being densely forested, and the abundance of cultivated food everywhere met with indicated the unmistakable fertility of the soil. The natives were very friendly, and evinced eager desires to trade with the members of Sir William MacGregor's expedition. They are typical Papuans, possessing a useful knowledge of wood-carving. They are remarkable experts in shield dancing, and performing graceful movements in social pastime. In general appearance these people bear a very close resemblance to their neighbours of Murua. They catch great quantities of fish, which are, with other articles of food, cooked in wide-mouthed clay pots. It was found upon inspection that, both in respect to

resources and population, the Trobriand Group is of greater extent than previously reported, even of such magnitude that the satisfactory accomplishment of its examination could not occupy less time than several weeks.

Mr. A. J. Boyd, who initiated the discussion upon the foregoing paper, stated that some years ago he met a captain at Townsville, who had visited the north-eastern coast of New Guinea. and had brought away some very beautiful flax produced there. In concluding his remarks, he complimented the author upon the value of his paper.

GEOGRAPHICAL NOTES.

EUROPE.

The Teaching of Geography in the Scottish Universities.—A Memorial, signed by His Grace the Duke of Argyll, has been presented by the Council of the Royal Scottish Geographical Society to the Commissioners appointed by Parliament in *The Universities (Scotland) Act, 1889*. The Universities Commissioners were, in 1890, engaged in considering the re-arrangement of the Faculties and the Curricula in the Scottish Universities, at which time the Council of the Society took steps to press on them very urgently the claims of Geography to be recognised as a department of the Higher Education.

In the opinion of the Council, the adequate recognition of Geography in that respect implies—

(*a*) That Geography should be included in every University Preliminary or Entrance Examination, and should be accepted as one of the optional Pass Subjects qualifying for a Degree in Arts and in Science.

(*b*) That provision should be made for the systematic teaching of Geography within the Universities, or within one or more of them, by the foundation either of Professorships or of Lectureships, fully equipped with the necessary apparatus in maps, charts, globes and models.

I. In order to make the position of the Council in this matter clear, it is necessary, in the first place, to explain briefly what the Council understands Geography to mean and to comprise.

It may be admitted at once that Geography, as popularly understood, and as too frequently taught in Schools—implying as it does little more than a memorized knowledge of names and places—has no claim to be recognised as a University subject, or indeed as a subject of Education in any true sense. That, however, is not the kind of Geographical study that the Council seeks to encourage. The Society has shown, by its system of Examinations in Schools during several years past, that it aims at promoting more systematic, more scientific, and more useful methods of teaching the subject than those that prevail at present. Indeed, the con-

viction that little improvement can be looked for in this respect until the country has been furnished with a supply of teachers competent to treat the subject at once as a valuable body of knowledge, and as a powerful instrument of intellectual development, is one of the main reasons which have led the Council to urge the recognition of Geography as a University subject.

By Geography in that sense the Council understands a complete and systematic knowledge of the Earth's surface - including land, sea, and air —as the theatre of human energy, and of the laws which regulate Man's relations to his physical surroundings.

To the same effect, though more detailed, is the definition of Dr. Archibald Geikie, which is as follows :—

"Geography, looked at from the scientific side, is not itself a science, but rather a department in which various sciences are co-ordinated in such a way as to present a vivid picture of the different regions of the world, and a clear statement of the causes that determine the resemblances and contrasts of these regions. The forms of the land and their origin, the climates of the globe, the distribution of plants and animals, and the causes that have regulated it, the influence of the variations of climate, soil, and topography upon the history of man, the reaction of man upon nature—these, and a thousand other connected problems, form the subject of the highest kind of Geography."

That is the kind of Geography that the Council wishes to promote in the Scottish Universities, and through them in Scottish Schools of every grade. The subject is undoubtedly wide enough to afford material for several courses of lectures. It includes :—

Mathematical and Astronomical Geography.
Physiography, including Meteorology.
Topography.
Commercial and Industrial Geography.
Historical Geography.
Ethnography.

It has also very close relations with

Geology.
Botany.
Zoology.
Sociology.

The Council thoroughly agrees with Dr. Geikie, when he adds to his definition of the scope of Geography, that—

"Such a theme, invested with so much deep human interest, possesses a peculiar value in Education. Indeed, I know of no other that lends itself so effectively to the teacher who wishes to inspire his pupils with some

appreciation of the nature and value of scientific observation and reasoning."

II. Regarded in this wide sense, the Study of Geography is of value—

(1.) *As a body of knowledge.*—It widens the field of interest in the physical aspects of Nature, and in the political, social, and religious affairs of Man.

(2.) *As an intellectual training.*—It exercises the reasoning faculty in tracing phenomena to their producing causes. It exercises the judgment in determining the particular causes, single or combined, to which a particular effect is to be ascribed. It exercises the imagination in the effort to realise scenes of grandeur and beauty.

(3.) *As helpful to the study of other departments of knowledge.*—It is essential, for example, to the study of Geology and of History; and it is an invaluable aid in the study of Zoology, Botany, and Astronomy, while the knowledge of these Sciences also reacts on and enlarges the study of Geography.

(4.) *As an aid to Industrial and Commercial development.*—It conveys a systematic knowledge of the productions of the different regions of the Earth, vegetable and mineral, and of the laws which regulate their interchange.

(5.) *As Technical training for Teachers.*—It affords an admirable means of practising the art of communicating knowledge, and of training the mind. Indeed, the British Association, in a recent report (Chemical Section, 1889), pronounced Physical Geography to be the best form of elementary science for educational purposes.

III. Professorships or Lectureships of Geography would be of value—

(1.) As a means of teaching the principles of Geography in general.

(2.) As a means of calling attention to, and of furnishing accurate information regarding, regions and places which from time to time acquire special prominence.

(3.) As a means of encouraging research, and of furnishing advice for the guidance of Explorers and Specialists.

(4.) As a means of giving an impetus to the scientific teaching of Geography, and of furnishing the country with competent teachers.

(5.) As a means of training and inspiring a staff of competent scientific observers among the men who are led to visit remote parts of the world in the prosecution of their professional work, as Doctors, Missionaries, Engineers, Merchants, Teachers, Explorers, and Officers in the Public Services.

In continuation, the Memorial states that in Germany there are Professorships of Geography in thirteen Universities, and Lectureships in

Wurzburg and Freiburg; France possesses Chairs of Geography, under the control of the University of France, at fifteen educational centres; in Austria-Hungary there are Chairs of Geography in ten Universities; Italy boasts of eleven University Chairs of Geography, Switzerland of four; Russia, the Netherlands, and Denmark have each one University Chair devoted to this subject; both Oxford and Cambridge have Lectureships of Geography; and in Owens College, Manchester, Geography is regularly taught, both on its historical and on its scientific side.

The Appendix to the Memorial contains an abstract of the course of study in Geography in four of the leading Universities of Germany.—*The Scottish Geographical Magazine*, November, 1890.

Recent Pendulum Observations in Russia.—From a paper on the above subject by E. Delmar Morgan, published in the *Proceedings of the Royal Geographical Society*, England, March, 1891, we extract the following interesting information:—

In 1884, the Russian Geographical Society decided on taking in hand a series of pendulum observations at several stations, in order to investigate the distribution of gravity in Russia. Having procured the necessary pendulums, observations were made by M. Lenz, at Berlin and Pulkova, in order to establish a connection with those hitherto made in Europe and Asia. Matters were so far advanced, that by the end of June, 1887, M. Wilkitzky was despatched to make the necessary observations in Nova Zembla and at Archangel. The apparatus consisted of three pendulums, oscillating $\frac{3}{4}$ second, and furnished with agate knife-edges. The following are the results of Wilkitzky's determinations:—

The definite value of a single infinitely small oscillation, T, is for the two pendulums:—

	No. II.	No. III.
At Pulkova (initial)	$0''.7499441 \pm 14.8$	$0''.7499169 \pm 23.4$
,, Nova Zembla	$0''.7496136 \pm 26.1$	$0''.7495878 \pm 33.8$
,, Archangel...	$0''.7497935 \pm 11.8$	$0''.7497689 \pm 14.6$
,, Pulkova (terminal)	$0''.7499447 \pm 18.2$	$0''.7499140 \pm 23.4$

Starting with these numbers, Wilkitzky finds the following values of the differences in length of the seconds pendulum:—

	No. II.	No. III.	Mean.
Nova Zembla—Pulkova ...	+0.8632 mm.	+0.8549 mm.	0.8591 ± 63
Archangel—Pulkova ...	+0.3856 mm.	+0.3739 mm.	0.3797 ± 36

And, adopting for the length of the seconds pendulum at Pulkova the value formerly determined by Stebnitzky, 994.8384 mm., he obtains the following:—

For Nova Zembla, 995.6975 mm.; Archangel, 995.2185 mm.

These results give the following values of the length of the seconds pendulum in English measure :—

Pulkova	(lat. 59° 46′)	39.1672 inches.
Archangel	(,, 64° 34′)	39.1822 ,,
Nova Zembla	(,, 72° 23′)	39.2010 ,,

GENERAL.

Lands of the Globe Available for European Settlement.—The following tables, extracted from a paper read by Mr. E. Ravenstein at the last meeting of the British Association, are copied from the February number of *The Scottish Geographical Magazine :*

THE WORLD'S POPULATION IN 1890.

	Population.	Average to a square mile.	Increase per Decade per cent.
Europe,... ...	380,200,000	101	8.7
Asia, ...	830,000,000	57	6
Africa, ...	127,000,000	11	10
Australasia, ...	4,730,000	1.4	30
North America,	89,250,000	14	20
South America,	36,420,000	5	15
Total,	1,467,600,000[1]	31	8

CULTIVABLE AREA OF THE GLOBE (IN SQUARE MILES).

	Fertile Region.	Steppe.	Desert.	Total.[2]
Europe	2,888,000	667,000		3,555,000
Asia	9,280,000	4,230,000	1,200,000	14,710,000
Africa	5,760,000	3,528,000	2,226,000	11,514,000
Australasia... ...	1,167,000	1,507,000	614,000	3,288,000
North America ...	4,946,000	1,405,000	95,000	6,446,000
South America ...	4,228,000	2,564,000	45,000	6,837,000
Total, ...	28,269,000	13,901,000	4,180,000	46,350,000

1. Exclusive of 300,000 in Polar Regions.

2. Exclusive of the Polar Regions (4,888,800 square miles).

Oceanic Circulation.—*Le Globe*, 5ème Série, Tome 1er, contains a mémoire by M. Emile Chaix on this subject. The author describes the methods adopted to ascertain the existence and velocities of currents, and

enunciates the theories that have been propounded, both in ancient and modern times, to elucidate the process of oceanic circulation. Finally, he states the causes most generally accepted at the present day to be: (1) differences of density, particularly those due to temperature, which, owing to the action of gravity, produce a slow progression of the waters of the Polar Seas towards the Equator, this motion being confined to the depths of the ocean; (2) the prevailing winds, which cause perceptible currents on the surface, and, after long continuance, make their influence felt to a certain depth below the surface; and (3) a movement of compensation, to which may in general be attributed the residuary phenomena not accounted for by the direct action of the wind, and which gives the key to a host of apparent anomalies.—*The Scottish Geographical Magazine*, February, 1891.

MISCELLANEOUS.

The Elder Expedition.—The proposed expedition to explore the unexamined parts of Australia, mentioned in Vol. V, Part 2, p. 128, of the Proceedings and Transactions of our Society, the whole of the expense of which is defrayed by Sir Thomas Elder, has started for the central part of the continent. A very large and representative assembly met at Adelaide on the 15th April to witness the departure of the expedition. The party, which will penetrate the interior from the Everard Ranges, consists of Messrs. David Lindsay, F. W. Leech, Lawrence A. Wells, surveyor; Dr. Elliott, of Townsville, medical officer and botanist; R. Helms, of Sydney, zoologist and naturalist; Victor Streich, of Adelaide, geologist and mineralogist; R. G. Ramsay, A. B. Gwynne, and C. A. Bawden, in addition to four Afghans and a black boy, and about forty camels provided by Mr. Leech, who is second in command, and has had considerable experience in exploration.

Sir William MacGregor.—The Council of the Royal Scottish Geographical Society has conferred the Honorary Diploma of Fellowship of that Society upon our Honorary Corresponding Member, Sir William MacGregor, Administrator of British New Guinea, who is thereby declared a Fellow of the Society.

Mr. J. P. Thomson.—The Council of the Manchester Geographical Society has elected our Hon. Secretary and Treasurer, Mr. J. P. Thomson, an Honorary Corresponding Member of that Society.

PROCEEDINGS AND TRANSACTIONS

OF THE

Queensland Branch

OF THE

ROYAL GEOGRAPHICAL SOCIETY

OF

AUSTRALASIA.

6th SESSION,
1890-91.

EDITED UNDER THE AUTHORITY OF THE COUNCIL OF THE SOCIETY

BY

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Honorary Corresponding Member of the Société de Géographie Commerciale de Paris, the Société de Géographie de Marseille, the Royal Scottish Geographical Society, the Manchester Geographical Society, and of the Sociedad Cientifica "Antonio Alzate," Mexico.

The Authors of Papers are alone responsible for the opinions expressed therein.

VOL. VI. PART II.

Brisbane:
WATSON, FERGUSON & CO., PRINTERS, QUEEN STREET.

1891.

NOTICE.

All Donations presented to the Queensland Branch of the Society are acknowledged by letter and in the printed Proceedings of the Society.

N.B.—All communications to the Society should be addressed as follows:—

HONORARY SECRETARY,

ROYAL GEOGRAPHICAL SOCIETY OF AUSTRALASIA,

BRISBANE, QUEENSLAND, AUSTRALIA.

CONTENTS.

VOL. VI. PART II.

WATSON, FERGUSON AND CO., PRINTERS, BRISBANE.

FOURTH ORDINARY MEETING.

Sixth Session.

The fourth ordinary monthly meeting of the sixth session of the Royal Geographical Society of Australasia, Queensland Branch, was held in the Museum Library, Brisbane, on the evening of Friday, April 3, 1891, at 8 o'clock. Mr. W. H. Miskin, F.L.S., F.E.S., occupied the chair.

Elections.—Ordinary members, Capt. J. Williams, Messrs. H. C. R. Nicholas, and J. V. Mulligan.

A letter was read from the Committee of Organisation of the Fifth Congress of Geologists, Washington, U.S.A., inviting the Council and members of the Society to attend the Congress.

The Hon. Secretary also read the following communication from Mr. S. P. Smith, F.R.G.S., Hon. Corresponding Member of the Society.

Wellington, New Zealand,
January 28th, 1891.

Dear Sir,

I duly received your cablegram of the 6th January, and subsequently, your letter of the 3rd January—appointing me to represent the Royal Geographical Society of Australasia, Queensland Branch, at the meeting of the Australasian Association for the Advancement of Science, at its Christchurch meeting. I at once gave notice to the General Secretary of the appointment, and proceeded to Christchurch on the 15th January—and remained during the session.

I am sending you by this mail, copies of the Christchurch "Press," from which you will get a very fair idea of the business before the Association, and also, a set of the official publications.

Taken altogether, the meeting was a pronounced success. There was a large attendance, especially so of Australians ; that is, if we consider the great distance so many had to come. All the colonies except Western Australia were represented, in addition to many visitors from other parts of this colony, and a few from England. The American Association for the Advancement of Science, did us the honor to send their President, Professor Goodale, with kindly greetings and wishes for the success of our Association. I counted the names of 133 people in the visitors' books, the greater number of whom were visitors from outside Christchurch. Such of the sections as I was able to attend, were well attended ; and a large number of interesting and instructive papers were read.

I consider that the geographical section was very well attended, so much so, that on two occasions room could not be found for the visitors.

We all regretted the unavoidable absence of our President, Mr. G. S. Griffiths, F.R.G.S., F.G.S. His place was filled by Mr. F. R. Chapman and myself, on alternate days. The reading of the President's Address, drew together a large number of people, as did the discussion on Antarctic exploration, which followed the next day. Mr. Griffiths' address was a resumé of Australian exploration during the past year, together with an exhaustive advocacy of Antarctic exploration. It was followed on the next day by a paper on the same subject, by Mr. Purnell, of Ashburton, N.Z., after which a most interesting discussion on the subject took place, in which Baron Mueller, the President, (Sir James Hector) Professor Kernott, Mr. F. R. Chapman, Bishop Neville, and others took part.

A considerable amount of enthusiasm was shewn by all present, which, let us hope, may take some practical direction towards accomplishing the hopes expressed in the President's Address.

The sectional committee—after adding some names—(amongst which I ventured to include your own), recommended to the general committee, the desirability of re-appointing the Antarctic committee, but by some miscarriage, the reason of which I have not been able to find out, the subject was not brought up at the final meeting of the general committee, and therefore, I fear the appointment has lapsed.

The other papers before the geographical section were of great interest. especially one by Dr. Hocken, F.L.S., of Dunedin, on the "Early Exploration of New Zealand," a subject on which he is perhaps better able to speak than any other man.

I need not refer to the other sections, for the papers sent with this give you a better description of the papers read than I could.

The arrangements made for the meeting by the General Secretary, Professor Hutton, were very complete, and reflect great credit on him.

The Canterbury College which the Governors kindly lent for the use of the Association meeting, answered the purpose admirably.

The meeting opened on the 15th January, and closed on the 21st, when the members dispersed to the various excursions provided, or to other resorts in the South Island.

I remain, Dear Sir,
Yours very truly,
S. PERCY SMITH

J. P. Thomson, Esq.,
Hon. Secretary Royal Geographical Society
of Australasia, Queensland Branch.

Mr. Smith was accorded a cordial vote of thanks, on the motion of Mr. Thomas Bartholomew, seconded by Dr. J. N. Waugh.

A paper by Capt. John Mackay, entitled :—Mysteries of the Western Pacific, was read, and should have been published in

our "Proceedings and Transactions," but that the author objected to its publication unless the full paper, "as written," without any excisions, was printed. Upon this subject the Council of the Society and the author differed.

FIFTH ORDINARY MEETING.

Sixth Session.

The fifth ordinary monthly meeting of the sixth session of the Royal Geographical Society of Australasia, Queensland Branch, was held in the Museum Library, Brisbane, on the evening of Thursday, June 11, 1891, at 8 o'clock. Mr. C. B. Lethem, C.E., occupied the chair.

A communication was read from Sir Donald Smith and Major Huguet-Latour, inviting the Council and members of the Society to attend the Montreal Annual Meeting of the Royal Society of Canada.

The Hon. Secretary gave notice of his intention to move at the Annual General Meeting, that provision be made in Clause 9 of the Constitution and Rules of the Society, for a Council consisting of twelve members, including a President, a Vice-President, and an Honorary Secretary and Treasurer, and that following clauses be amended agreeable with this alteration.

The Hon. Secretary also read a letter from His Excellency the Governor, General Sir H. W. Norman, accompanied by a paper on the proposed exploration of the Antarctic regions. This paper, which was presented to his Excellency when in London by Admiral Sir Erasmus Ommanney, deals with the results of the deliberations of an influential Committee, composed of men of eminence in the promotion of science, appointed for the purpose of drawing attention to the desirableness of prosecuting further research in the Antarctic regions. These results briefly summarised are as follow:—Many observations of great scientific value might be made in the Antarctic regions, and it would be very desirable in the interests of science to embrace an opportunity of making them. Among such observations may be mentioned, in what is perhaps the order of their importance:—1. Hydrographical observations, especially with regard to the distribution of open sea. 2. Meteorological

observations, especially with regard to the barometric pressure and the direction of the winds, to which may be added observations on the Aurora Australis. 3. Magnetic observations, more particularly with a view to determine the changes which have taken place in the magnetic elements since the expedition of Sir J. Ross in 1839-43. 4. Observations on the temperature of the ocean and on ocean currents. 5. Soundings and dredgings and observations on the nature of the sea bottom. 6. Collections and observations on the marine fauna and flora. 7. Should land be anywhere discovered, geological and biological observations thereon would be of exceedingly great value. It is obvious that an expedition adequately prepared and equipped to carry out all the above various observations would involve an expenditure far exceeding the £10,000 mentioned, but the Committee is led to believe that this sum would suffice for a smaller pioneer expedition, which, while avowedly not designed to undertake an exhaustive inquiry, would be able, under competent direction, to make a careful survey of the northern boundary of the circumpolar ice region, to determine approximately the distribution of open water and the direction of oceanic currents, to make magnetical and meteorological observations, and, by means of the tow net and the dredge, used at moderate depths, to collect pelagic animals and plants. The results of such a general survey, even though not wholly complete, would not only of themselves be of great interest and value, but also be of paramount importance in guiding to a decision as to the desirableness, or the contrary, of sending out in the future expeditions more thoroughly equipped for special observations, and in preparing the way for such expeditions, should the preliminary results seem to render these desirable.

The Hon. Secretary informed the meeting that nothing had been done in Brisbane to further the interests of the proposed expedition to the Antarctic regions. He regretted to state that the joint committee of members of the local Royal Society and the local branch of the Royal Geographical Society had displayed no practical activity in endeavouring to discharge the duties

accepted by and imposed upon them. In the interests of science alone this was to be deplored.

Capt. W. C. Thomson then read a part of a paper entitled:—

Among the S.E. Solomons.

By Douglas Rannie.

of which the following is an abstract.

Concerning the South East Solomons, Mr. Rannie says:—With favourable weather, the run down from Queensland to the Solomons, generally occupies about five days. On the morning of the fourth day we are roused by the cry of "land oh!" and we see the most southerly of the Solomons, viz.: Rennal and Balona Islands. They are at present of very little importance, and are seldom visited. On the morning of the fifth day, our boats are lowered, and we go ashore at Santa Anna, the first island Don Alvaro de Mendaña arrived at in this group, when on his expedition from Peru in 1595. As early as 1567, Mendaña discovered the Island of Isabel, and on his return, he reported having discovered a large country where he supposed King Solomon had obtained his gold wherewith to decorate the temple in Jerusalem Thus the islands became known as Solomon's islands. But not till twenty years afterwards did he visit the supposed Ophir. In 1595, the Governor of Peru, to get rid of a lot of turbulent young bloods who began to gather from Spain in crowds, fitted out an expedition which he put under the command of Mendaña, and they set sail from Payta in Peru, on the 16th June, 1595. On the 21st July, he discovered a group of islands which he named Las Marquesas de Mendoca, in honour of the wife of the Governor of Peru. They are now known as the Marquesas simply. I will not here say anything further about the wanderings of Mendaña, as I believe Mr. Woodford's able article on this subject is published in last July's Journal of the Royal Geographical Society of England From the time of Mendaña's visit, the Solomons remained for nearly two hundred years unvisited by Europeans, and their position was not definitely fixed

until Surville in the "St. Jean Baptiste," visited them in 1769. Carteret passed through the northern portion in 1767; Bougainville in 1768; Shortland in 1788; and Admiral d'Urville in the "Astrolabe," in 1838.

The writer on arrival in Port Mary, Santa Anna, gives an interesting description of the native villages, and of his vain attempts at prospecting on the Island of St. Christoval. He describes Makira Harbour as one of the finest in the South Seas, only to be compared to Port Sandwich in the New Hebrides. The natives appear to evince great care in the building of their houses, which consist of four stout walls thatched with leaves of the ivory-nut palm, the greatest attention being paid to the men's or "taboo" house. All over this house exists skilled carvings of colossal figures, and stuffed skins of sharks and porpoises, containing the bones of the illustrious dead. The war canoes are described as beautiful works of art. An amusing incident occurred here when the chief of Makira took two old bush chiefs on board the schooner, and requested that the gun might be fired for their edification. The two old chiefs stood on the gun whilst it was fired. Their amazement and terror was such that they jumped overboard, and on reaching the beach ran for their lives and were seen no more. Leaving Makira, the voyagers visited Monangi, where the people of Annuta deposit their dead in heaps—a ghostly looking cemetery. Hada Bay was next visited, but the writer did not seem impressed by the fertility of the shores, or the density of the population which was principally settled on the north side of the island. The natives are described as powerful, well-built men, with hair curiously dressed, noses and ears pierced for bones and shells, and wearing no clothing. They are cannibals, as are the natives of other islands in the group, and cunning and treacherous. It was on St. Christoval, that Mr. Bevan, Fijian Government Agent, was murdered. The weapons used are the bow and arrow, club, spear, and wooden sword, and a few have muskets and rifles. The island is seventy-nine miles long, by seventy broad; and its highest peak rises to 4,100 feet. Thirty-five miles to the north-

west of St. Christoval, the traveller came to the magnificent island of Guadalcanar, eighty-two miles long, by thirty-three in breadth, with mountain tops rearing their summits over 8,000 feet above the sea level, and rising boldly from the water's edge. The whole coast from Marau Sound on the east, to Cape Henslow, the most southerly point, and thence to Wanderer Bay, is open and unsheltered, lashed for nine months in the year by a heavy surf, which renders landing in boats almost impossible. Still it is thickly populated, and every mile is relieved by picturesque little villages. The reason for the dense population on the weather side, is that the natives are thus protected from their enemies by the surf in front and the mountain range in rear of them. So far, the interviews with the natives appear to have been all of a pacific character, and the people of Guadalcanar are described as the most friendly-disposed towards white men of any natives in the group. Mr. Rannie says :—"I have never had any trouble with them myself, nor do I know an instance of their having attacked white men, with the exception of the murder of Mr. Boyd, of the yacht "Wanderer." This story is well known in Australia, but Mr. Rannie states that the natives all affirm that Mr. Boyd was not killed by a native, but by men of his own party who landed with him. He gives the tale for what it is worth. At the same time the natives are notorious head hunters, and the writer gives a graphic description of a visit to the Taboo house of a village, where rows of lately decapitated heads were exposed on a bench.

Anchoring in Wanderer's Bay, a good piece of level land was found to run from the sea-coast back to the mountains, in all comprising about 5,000 acres. This country is well watered by two everflowing rivers, and is covered with dense scrub, but no natives live on the bay coast. There is splendid shelter from all but westerly winds, and good holding ground in seven fathoms, a quarter of a mile from the beach. The natives at the time of Mr. Rannie's visit, were at war with each other, and head hunting was the general pastime. At Yarrow Bay, a magnificent land-locked sheet of water, they witnessed a peculiar native

funeral, the body being sunk to the bottom of the sea, and there made fast by divers. No wonder the sharks here are numerous and bold. From Nagle Bay the vessel went to Coughlan Harbour, where the scenery is described as something magnificent. it is in fact, the finest part of Guadalcanar, yet the most sparsely populated, owing to the head hunting proclivities of the natives of Savo. The natives of Coughlan Harbour are the blackest, (except those about Bougainville) the most powerful and tallest of any of the Solomon islanders. In dress, both men and women are very fastidious, and they wear live butterflies attached by a thread to their hair. They are exceedingly industrious, and are especially expert in fishing One of their peculiar modes of catching fish, is by means of a line attached to a kite. Their weapons are the usual spear, wooden sword and shield, and spears made of human bones.

Leaving Guadalcanar, the voyagers next anchored at Savo. ten miles to the northward. It is a small island ten miles in circumference, with a belt of level land two hundred yards broad. running round it, from which mountains rise to a height of 1,800 feet. The houses of the natives are beautifully built with raised floors, verandahs, and square windows. The natives are notorious head hunters, and make long excursions in their great war canoes to obtain heads and captives. Strange to say, they boast of never having killed a white man, and hope never to do so. Their slaves are treated as members of their owners' families. There are some remarkable hot springs on the island, which the natives use for cooking purposes. On the beach the white men were shown "egg farms," which are worth describing. Patches of the sand are marked off in squares and pallisaded, and the sand hens, which are as large as the domestic hen, lay their eggs in these pallisades, and whatever eggs were in each square, are the sole property of the owner of the patch. The hen burrows in the sand to a depth of four feet, and then deposits the eggs, the number of which is enormous. The women make large omelettes of the eggs, by filling a bag of green leaves with a mixture of eggs and grated cocoa-nut. They then take this bag to one of

the hot springs, and boil it till the contents are quite hard. The omelette cut in slices is very good eating, and serves as an article of barter at the markets in the neighbouring islands. Some of them measure over two feet in length, by a foot in circumference. The eggs themselves are the size of a large turkey egg.

The Florida group was next touched at. One of the islands, Mandoleana, is the scene of the massacre of Lieutenant Bowers of H.M.S. "Sandfly," and his boat's crew. Owing to the labours of Bishop Selwyn, the natives now all profess Christianity, and native churches are seen in all the islands. After leaving Florida, the vessel anchored at Malayta. Here the natives proved treacherous, and on the visitors declining to go ashore, fire was opened upon them with rifles, but no damage was done, and a return fire scattered the attackers. A very fine river one hundred yards wide, waters this island, and its banks would afford a rare treat to the botanist, owing to the number of rare and beautiful orchids and ferns that abound. The natives were at war with each other, and the explosion of firearms and beating of war drums could be heard in all directions. There are no salt-water men here, as all the inhabitants live five or six miles inland.

At Hawkie, the next anchorage, it was found that the natives live on two small islands built out of the sea. They are the descendants of people who have not been powerful enough to dwell on the mainland, and so entrenched themselves with stone walls on these islets. They have no gardens, but are industrious fishermen. Every alternate day is market day, and the bush people come down to the coast to buy fish.

At Langa-langa, the native money is made. The highly prized red-money is made by a tedious process from the shell of an oyster obtained in very deep water by diving. Every native here has his familiar spirit, supposed to be the spirit of a deceased relative. They consult these spirits on all that concerns themselves and their doings. When anyone dies the "devil-devil" man is consulted; of course he is a cunning charlatan, who preys upon the superstitions of his dupes. The largest war

canoes in the South Sea Islands are built here. One the writer measured, was sixty-four feet long, with a beam of ten feet, and capable of carrying 120 men. Many of the large canoes are used as cargo boats, which trade to Florida for cocoa-nuts, a great article of trade. At this place there is only one tide in twenty-four hours, and the sea is encroaching on the land.

The vessel now went cruising with a pilot, rejoicing in the name of Mow-wallah, to Alo-olo and Soo, where the party very nearly came to grief, but some friendly natives gave timely warning. Soo means "Place of Fresh Water," and Sooah, the next anchorage, "The Place of a Spear." At Wysissie, the natives had determined to capture the vessel, but the full ship's company turning up on deck armed to the teeth, overawed them, and they quietly slipped away.

Passing Hoohoo, the vessel entered Maramasiki Passage, which divides Malayta in two. This was the fourth vessel which had passed through it, and the only one which did not take the ground. The length of the passage is twenty-five miles, and each bank is lined with mangroves, which extend three or four miles inland. Threading their way by the help of their pilot, through passages in the mangroves, the adventurers passed up some beautiful tropical rivers, with magnificent fertile lands extending from their banks.

Some horrible anecdotes are recorded of the natives of Port Adam headed by their chief Powlanga, whose proceedings with his captives eclipse those of the Red Indians of North America. The cruise now took the writer past the fine harbour of Iok, Chimarago and Ooroo, at all of which places harrowing tales are told of the atrocities committed by the natives on white men.

At Urassey are the head-quarters of the chief Quisooleae, the greatest warrior of Malayta, who is an object of hate and distrust of all the other chiefs, whom he despoils and defies in his islet stronghold. It was from Urassey that Jack Renton, a young Scotchman, was rescued from a captivity which had lasted nine years.

The cruise was now nearly over, and running round the north

end of Malayta, the vessel anchored next day at Breena, to land the pilot and interpreter, Mow-wallah, who had assisted the voyagers for forty-five days. After a hearty farewell from the natives, a start was made for Florida, where a load of cocoa-nuts and vegetables was shipped, then touching for a short time at Savo, a departure was made for Queensland, the natives first sacrificing a score of cockroaches, by hanging them by the neck from the jibboom, as a propitiatory offering to the gods of the winds and waves.

ANNUAL MEETING.

The sixth Annual General Meeting of the Royal Geographical Society of Australasia, Queensland Branch, was held in the Museum Library, Brisbane, on the evening of Monday, July 6, 1891, at 8 o'clock. The President, the Hon. Sir Samuel Walker Griffith, K.C.M.G., &c., occupied the chair. On his right was seated His Excellency General Sir Henry Wylie Norman, G.C.B., G.C.M.G., &c., Governor of Queensland, and on his left the Hon. A. C. Gregory, C.M.G., &c., one of the Past-Presidents. There was a large attendance of members and friends.

The minutes of the previous ordinary monthly meeting were read and confirmed.

Correspondence.

The Hon. Secretary read the following correspondence:—

Telegraphic message from Melbourne, for J. P. Thomson, Hon. Secretary Royal Geographical Society, Brisbane.

"Accept best felicitation at Geographic Anniversary. Queensland's ready aid Nordenskiöld Expedition, tended much securing fund, one thousand, Robert Reid. Now favourable views Admiral Ommanney, enunciated by your Governor. Great support. Large British Expedition ought to follow after this reconnoitring. Ample work for many years."

Baron Von Mueller,
President R.G.S.A.,
Victorian Branch.

Also a letter from the Hon. Secretary of the Royal Society of Queensland, wishing success to the meeting, and referring in general terms to the lack of interest shown in Brisbane in the proposed Expedition to the Antarctic regions. He regretted that engagements prevented him from attending the meeting.

The Hon. Secretary stated that he had been requested to call the attention of the Society and of the general public, to the meeting of the Australasian Association for the Advancement of Science, which is to be held in Hobart, on the 7th January, 1892. He hoped that every one interested in the objects of

the Association, would either attend that conference or stimulate it towards success as much as was possible.

Amendment of Rules.

The Hon. Secretary said: The Council of the Society having considered it desirable, in order to increase its strength, to amend some of the rules, I beg to move, in accordance with notice of motion given at the last monthly meeting:—

"That clause 9 of the Constitution and Rules of the Society, be altered so as to read as follows, namely:—

> The government of the Society shall be vested in a Council consisting of twelve (12) members, including a President, a Vice-President, an Honorary Secretary, and an Honorary Treasurer, to be chosen annually and elected by the Society, as hereinafter directed. Three (3) members shall form a quorum.
>
> In clause 13.—That the word "President" precede the word "Vice-President."
>
> In clause 15.—That the word "two" be substituted for the word "three," and that clauses 10, 12, 14, 17, 35 and 42, be so far amended as to agree with these alterations."

I may mention that, in order to relieve me of some of my duties, the Council has decided to appoint an Honorary Treasurer as a distinct office. I have during the past six years discharged the duties of both Hon. Secretary and Treasurer, and the work has occupied all my spare time, some of which I could ill afford. This, together with the desire to strengthen the Council, is the reason for the proposed amendment of the rules.

Mr. J. Fenwick seconded the motion, which was carried unanimously.

Report of Council, Session 1890–1.

The Hon. Secretary read the following report on the operations of the Society during the preceding year:—

The Council has the honour of submitting for the information of the members of the Queensland Branch of the Royal Geographical Society of Australasia the following usual Annual Report, upon the operations of the Society during the preceding official year:—

Membership.

The sixth session of the Society terminated with the month of June, 1891. At that time the members of the Society numbered 125, including ten life members, 106 ordinary members, three honorary members, and six honorary corresponding members.

Finance.

The subjoined financial statement is also submitted:—

ANNUAL BALANCE SHEET
OF THE
ROYAL GEOGRAPHICAL SOCIETY OF AUSTRALASIA (QUEENSLAND BRANCH),

Dr. FROM JULY 1ST, 1890, TO JUNE 30TH, 1891. Cr.

Dr.	£	s.	d.
To Balance in Q.N. Bank, June 30th, 1890	116	13	3
,, Entrance Fees, Subscriptions, and Diploma Fees, from July 1st, 1890, to June 30th, 1891	101	17	0
	£218	10	3

Cr.	£	s.	d.
By Printing the Proceedings and Transactions of the Society	62	15	0
,, Printing Circulars and Post Cards, and the purchase of Stationery and Postage Stamps	33	9	8
,, Caretaker of Museum for attendance	2	5	0
,, Freight and Entry on Books	0	11	0
,, Advertising	0	5	6
,, Balance in Q. N. Bank, June 30th, 1891	119	4	1
	£218	10	3

J. P. THOMSON, *Hon. Sec. and Treasurer.*

I have compared all the Vouchers, Cash Book, and Bank Pass Book, laid before me by the Hon. Treasurer, and found the same correct.

WARREN WEEDON, *Hon. Auditor.*

July 1st, 1891.

Meetings of the Society.

The annual and five ordinary monthly meetings have been held during the session. The papers read at these meetings were seven in number, including the anniversary address and a report by the Society's representative to the Christchurch meeting of the Australasian Association for the Advancement of Science. To the authors of these the cordial thanks of the Council are offered.

Council Meetings.

During the session the Council met twice specially, and eight times ordinarily, for the purpose of transacting the business of the Society. One of the special meetings was occupied in dealing with communications from the Victorian Branch of the Society, bearing upon the Elder Scientific Expedition to Central Australia, regarding which the Council was invited to assist in the formulation of a scheme to be submitted to Sir Thomas Elder. At the same meeting a special committee consisting of J. N. Waugh, M.D., R. Gailey, J.P., and the Hon. Secretary and Treasurer, J. P. Thomson, F.R.S.G.S., was appointed to act in concert with a similar organisation composed of members of the Royal Society of Queensland, for the purpose of furthering the interests of the proposed expedition to the Antarctic regions. It is, however, to be regretted that, notwithstanding the very valuable scientific results likely to be derived from an examination of the South Polar regions, the efforts of the Society to further that worthy object have not been productive of fruitful issue.

Publications.

The volume of Proceedings and Transactions of the Society has been published as usual. By the increasing numbers of applications from kindred associations in various parts of the world for exchanges, and by the frequent publication of abstracts from the Society's literature by cognate institutions, the Council is gratified to observe that our publications are appreciated. These, the Council begs to state, are circulated to scientific and learned societies in all parts of the globe, as well as to literary organisations, state and educational libraries.

Library.

Many valuable accessions have been made to the Society's library during the session. It is, however, to be regretted that no proper means of storage have yet been provided for the many

valuable works of reference in the Society's possession. The cordial thanks of the Society are again offered to the Trustees of the Queensland Museum for the use of the library room of that institution as a meeting place.

Exploration.

In Australia the special event of the past year was undoubtedly the despatch of the Elder Scientific Expedition to explore the unknown parts of Central Australia. This expedition, the organisation of which was entrusted to the Royal Geographical Society of Australasia, owes its existence wholly to the munificence of Sir Thomas Elder, of Adelaide, who, at a very great cost, has provided the necessary means for a thorough examination of all that was hitherto unknown of Equatorial Australia. In the British portion of New Guinea our knowledge has been increased considerably of the northern shores by the personal inspection of our indefatigable honorary corresponding member, Sir Wm. MacGregor.

For the Council,

J. P. Thomson,

Hon. Sec. and Treasurer.

The Hon. Secretary said: It is very gratifying to me, as honorary treasurer of the Society, to be able to hand over to my successor, when appointed, the funds in a very satisfactory condition. It has been only by great personal care on my part in endeavouring to keep down expense that the balance is as large as it is. I feel proud of the position the Society occupies financially.

His Excellency the Governor said: Mr. President, Ladies and Gentlemen, I have been asked to move the adoption of the Report of the Council and the approval of the Balance Sheet, and I have much pleasure in doing so. It is very satisfactory to learn that, as compared with our income, our Balance Sheet is very large. I could wish that our income was much greater, that there were many more subscribers, and that greater opportunities offered for spending money in the interests of geographical

science. I think it is to be regretted that this is not a larger society than it is at present, and I also deeply regret that there has been so much cold water thrown upon the proposed Antarctic expedition. In fact, nothing whatever has been done during the past year to further the objects of the expedition, by this or some other parts of Australia, which might be supposed to have greater interest in it. No effort has been made here to get subscriptions, and I really think it is worthy of consideration whether a working committee should not be appointed to try and give a little impetus to the undertaking, for it certainly has hung fire, although I do not think the expense of what I may call a pioneer expedition, would be very great. At all events, it would not cost as much as many English gentlemen spend in taking a voyage round the world in their yachts every year. I may say that when in England a few months ago, I had a conversation with Sir Erasmus Ommanney, who is very anxious that this expedition should take place He has had great experience in two Arctic expeditions, and I gathered from him and others acquainted with these matters, that a pioneer expedition that would involve the employment of a strong wooden steamer for six months—it is important that she should be constructed of wood, because iron steamers do not very well stand rough blows from the ice—would be of great service. Six months spent in the Antarctic regions by a properly equipped expedition, at no very great cost, would enable everyone to be able to judge whether it would be worth while to proceed with further exploration or not. Of course people may say that the expedition in 1839, under Ross, spent four summers in the Antarctic regions, but it must be recollected that that expedition was composed of two very slow sailing vessels, the "Erebus" and "Terror," which did not make much progress. In fact, a well equipped steamer would make as much progress in five or six months' absence from Australia, and by means of such an expedition, we should be able to ascertain definitely whether it would be desirable to send other expeditions in future years. I have much pleasure in moving that the Report be adopted, and I congratulate

Mr. Thomson on having such a large balance, as compared with income, which is not usually the case in other societies here, whose balance sheets I have seen.

The HON. A. C. GREGORY: I beg to second the adoption of the Report and Balance Sheet, and if I may be permitted, I should like to add a remark or two to what has fallen from His Excellency in reference to the proposed expedition to the southern regions. It may be said that we in Queensland have very little interest in explorations there, but that the southern colonies would be materially affected in a commercial point of view, by the discovery of say, a number of islands where sealing and other fisheries might be carried on. But in Queensland, we have ascertained by part experience, that our seasons are governed to a very great extent by the breaking up of the ice in the southern regions, and if it were possible to watch the accumulations of ice, and the periods at which these breaks occur, it is quite reasonable to suppose that eventually we might formulate such a scheme of forecasting our seasons, as would be of great advantage to all the colonies, Queensland included. It has been remarked that when the ice breaks up and the icebergs drift northward, we have experienced good seasons, and that while the ice is accumulating, we have suffered from droughts. The attempt to explain our seasons by reference to astronomical data, has unmistakably failed; we have therefore, to seek for some other explanation, and I do not think a sounder one than this can be found. It is well known that in North America and western Europe, when the ice breaks up and drifts down from the northern seas, they always have moist seasons; and that during the time the ice is becoming solid, which may be for some years previously, the seasons gradually get drier and drier. We may therefore reasonably suppose that the same conditions will apply here.

Motion put and passed.

ANNIVERSARY ADDRESS.

The Political Geography of Australia.

By the Hon. Sir S. W. Griffith, K.C.M.G., &c., President.

Sir Samuel Griffith said: The next item on the programme before me is the President's anniversary address. When, twelve months ago, you were good enough to elect me to the position of President of the Society, I accepted the office with some hesitation, because, from my somewhat numerous avocations, I was afraid that during the year I should not be able to keep myself abreast of the continual advances made by geographical science, so as to be able to perform that, after all, most difficult and, I suppose, most important function of the president—the delivery of an address at the close of his year of office. Since that time the duties devolving upon me have not been diminished, but rather considerably increased; I must, therefore, request the indulgence of the members of the Society for not having prepared a written address, which, I believe, is the usual practice, and ask them to bear with me while I adopt the unusual, but to me much more familiar, course of saying what I have to say without first reducing it into writing.

The objects of the science of geography are sometimes considered to be of a very limited nature, but I apprehend that the true definition of this science is that which was put forward not very long ago by the Council of the Royal Scottish Geographical Society, in an address to the University Commissioners, from which I shall take the liberty of reading a few words. It was an address or memorial by the Council, of whom the Duke of Argyll was President, to the University Commissioners, suggesting that geography should be made part of the curriculum of the Scottish universities; and in answer to the objection that geography, as very often understood, means little more than committing to memory lines drawn on maps and names of places, the Council said:—"By geography the Council understands a complete and systematic knowledge of the earth's surface—including land, sea, and air—as the theatre of human energy

and of the laws which regulate man's relations to his physical surroundings. To the same effect, though more detailed, is the definition of Dr. Archibald Geikie, which is as follows:—"Geography, looked at from the scientific side, is not itself a science but rather a department in which various sciences are co-ordinated in such a way as to present a vivid picture of the different regions of the world, and a clear statement of the causes that determine the resemblances and contrasts of these regions. The forms of the land and their origin, the climates of the globe, the distribution of plants and animals, and the causes that have regulated it, the influence of the variations of climate, soil, and topography upon the history of man, the reaction of man upon nature—these and a thousand other connected problems form the subject of the highest kind of geography.'" Accepting that definition of geography, which I think I fairly may, I trust that I shall be pardoned if I turn my attention for a few minutes this evening to what may be called "political geography," which is, perhaps, the branch to which my vocations more naturally lead me; and especially if I refer to the political geography of Australia. It is a subject of immediate interest to all of us, as well as of a great deal of interest to many other parts of the world. I think it will be found, if you refer to the history of other parts of the world, that the political geography—that is, the division of the world into nations, or into parts of the globe occupied by different peoples—corresponds to a very great extent with the physical divisions of nature. Of course, in the broadest sense that is obviously true. Islands standing by themselves, and countries separated from one another by large mountains or great rivers, are naturally at first separate peoples; and if you consider for a moment why there should be, or why there are, separate peoples in the world, you will come to the conclusion that they are the result of natural causes. Why is one people different from another? Without going back to very remote ages of which we know very little, there is evidence that at a period not so very distant in the world's history, and before they were divided into different nations, entirely separated

from one another, many families of the great human race had a common origin. For instance, the great Aryan family, which, we know, had a common home and language. But it afterwards became separated by mountains, rivers and other physical boundaries, into communities living apart, with very little intermixture, and which so acquired different habits, different speech, different modes of thought, and became at last entirely different nations. That, I suppose, is the origin of the formation of all the peoples in the world's history into different nations. And, I think, you will find on studying history that the political divisions—"political" is rather an unfortunate word; it is used in so many different senses, and frequently as referring to contentions and quarrels between individuals, but I use it in its higher and broader sense, relating to the business of governing mankind—I think that you will find that the political divisions of the human race into nations correspond to a very large extent and always tend to correspond with the physical conditions or aspects of nature, to employ the felicitous expression used by Buckle in his great work. Let us take a few illustrations which are familiar to us. Take the case of Greece. Greece was a country divided by mountain ranges into small fertile valleys. In early times the inhabitants of some of these valleys had great difficulty in communicating with each other, and the result was that they naturally formed small communities, and were to a great extent isolated from one another, each with its central city. Afterwards, when they came to know more of one another, and other people in their neighbourhood, they found it advisable to form themselves into a confederation, so that they were practically one people for some purposes, while at the same time they retained their differences as communities, being, in fact, a number of small nations often at enmity with one another, and occupying very small territories. In the case of Switzerland again, the country is divided by high mountains into several valleys, where the people gathered together into small communities, frequently at variance with their neighbours and among themselves, until, for self interest, they were formed

into a union, still of small extent. Take another illustration of a very different kind of country—Prussia. How is it that Prussia was the largest of all the German states? Germany was divided, as we all know, into an immense number of different states, and the reason why Prussia was the largest was because it consists of a vast plain. It is said that you could drive a coach and four all the way from the French border to the border of Poland; and being one large country—homogeneous as far as the aspects of nature are concerned—she formed one great state. The United States of America supply another illustration. There the country is partially divided by mountain chains, which run north and south. It has been observed before to-day that mountain chains running in that direction have very little effect in dividing peoples, while those running east and west operate very considerably as divisions between them. But the United States, notwithstanding these mountain chains, are substantially not divided by any natural features. Of course, other elements may come in as well, such as invasions by a hostile race, or a new country may be settled by different races—these are circumstances that may prevent for a time the operation of this general rule, which, perhaps, may be summed up by saying that the most important element to be considered in determining whether the inhabitants of any specified part of the globe will form one or several peoples is the means of communication between them. Looking at the world's history, you will find, as I have pointed out, that the principal boundaries between nations have been high mountains—I need not of course mention seas—or else wide rivers, or great expanses of desert, or steppes almost equivalent to deserts. For an instance of mountains, take the case of the Alps, separating France from Italy and forming the inhabitants into two distinct peoples, although they are to some extent allied in blood. The same fact may be observed in the case of the Pyrenees, which separate Spain from France, and prevented easy communication between the two countries at the time when the people were stereotyping into distinct types. If you take the case of rivers, probably the only wide river in Europe is

the lower Danube, which separates the peoples residing on either bank into different nations. But take the converse case of a narrow river. Look at the Rhine, with the same people living on both sides until it gets almost down to the ocean. Low chains of mountains, again, do not separate peoples to any material extent. I have referred very briefly to some parts of the world with which we are all familiar, showing how the political division of peoples corresponds almost entirely—at any rate, to a very large extent—with the divisions formed by nature.

Now, apply these rules to Australia, and what do we find? Australia is at present divided into different communities under different governments. But consider for a moment the actual physical divisions between the same colonies of Australia. Between New South Wales and Queensland there is for about fifty miles a small range, which is practically no division at all, so far as preventing means of communication. At present it is a rather sparsely-populated part of Australia, and not very many people, I suppose, go over it. From that westward there is a narrow, shallow river for 150 miles or so; and after that the whole of the boundaries which separate Queensland from the rest of Australia are imaginary lines drawn on the map, and marked in some places on the ground with posts at regular intervals. Between New South Wales and Victoria there is the River Murray for a distance of some 200 or 300 miles, perhaps rather more. That is not a wide river—not such a river as would tend to create a different people on one bank as compared with those on the other. "The aspects of nature," to use Buckle's phrase again, are the same on both sides. With these solitary exceptions—the Macpherson Range and the Dumaresq and Macintyre Rivers between New South Wales and Queensland, and the Murray River between New South Wales and Victoria—the whole of the boundaries between the colonies of Australia are imaginary lines drawn on a chart. I would submit to the members of this Society, that it is a condition of things unknown in the history of the world, that such

boundaries should constitute permanent lines of demarcation between peoples. At the present time the Australian colonies, as autonomous states to a very great extent, are practically, in their relations with one another, as distinct as different states in Europe. Their laws are different: they give no more privileges to the subjects of one another—with a few statutory exceptions, and these only by virtue of their own positive laws—than do the different states of Europe. That is a condition to which I call your attention for the purpose of pointing out how absolutely anomalous it is in the history of the world. But if we are to believe that "the thing which has been is that also which shall be"—a saying in which there is a great deal of wisdom—it is very unlikely that this state of things will continue. The inference to be drawn at this stage of the argument, I think, is that it is likely that these artificial boundaries will soon be overstepped, not only because we find that it has been so always, but because, if you come to think of it, it must be so. There is, perhaps, one exception in the case of Western Australia, which may be said to be separated from the rest of the colonies by something not unlike the steppes of Asia. These parts of Australia are not yet entirely explored, and an expedition has lately started to discover more about them, but we know pretty well what they will find. Although we cannot say exactly what the exploration will bring to light in this unknown territory, we know that the country does not differ very much in character from that known to exist in the rest of the interior of Australia. It may take some time to bridge over that distance, but I think that before long we shall find ourselves in frequent communication with that portion of the continent. And although they may remain for a time a separate people from the rest of Australia, I feel sure that their separation and isolation will be only temporary. Now we all know that it is impossible to keep people living side by side, with nothing to keep them apart, from intermixing with each other. Even different races, when brought into close contact with one another, usually mix together, unless there are some strong influences to keep them apart; and when

such people are of the same race, they are sure to mix, especially when their interests are common. Does it not follow that, unless human nature is different in Australia from what it is and has been elsewhere, the inhabitants will most certainly become one people for the purposes of government, as they are already one people in blood?

I have referred so far to what may be inferred from the aspects of nature—the physical conditions of Australia, and the purely artificial nature of the boundaries which exist between the different States. But there is another element to be taken into consideration apart from these, namely, what is called Patriotism, or love of country. Nations whose people do not possess the feeling of Patriotism or love of country, are not, so far as the history of the world teaches us, nations which have achieved or won much esteem for themselves, or whose people are much regarded outside their own country, if indeed they are within it. Patriotism may perhaps be called only a sort of exalted selfishness, a feeling of regard for one's own more than for a stranger, a development of the regard for one's own family rather than for the families of other people, for one's own friends and neighbours rather than people at distant places; and finally, a feeling of regard for the people of one's own country rather than the people of other countries when they come into competition with us. Because we know by centuries of experience, that some peoples and some other parts of the world are better off than others, and rightly or wrongly, we do not really regard all the people on earth as brothers; we do compete with one another, and the feeling of Patriotism—whether we may arrive some day at a state of such sublime perfection, that the feeling of Patriotism will no longer exist in regard to our own country as compared with the rest of the world, I do not know—but at the present time this sentiment may be regarded as one that is useful, and in every way estimable. But in order that there should be a real feeling of Patriotism, the sentiment must have some solid foundation. The sentiment of Patriotism must be for something that you can see or appreciate; it must be a regard for the place you

are in, for the people of your own country whom you know, with whom you are associated, of whom you, in fact, are one. That I put down as the first element in the feeling of Patriotism. The second is that it must be a sense of attachment to something worth having, an attachment to something worth making a sacrifice for. If these views are admitted—I think they will be found to be sound—it will follow that in Australia the feeling of Patriotism must be for Australia, for the country that we all know and can see. Although I am not a native of Australia, I have been here nearly all my life, and in spirit I am as much an Australian as any man in it. I repeat, the feeling of Patriotism must be for Australia. That must be our country; that is where our children will be born and brought up; and the mere recollection that our grandfathers or great-grandfathers came from another country, will not, I think, be a sufficient lasting foundation for the sentiment of Patriotism. The object of it must be something personal to us, something that we can see and appreciate, that we have an attachment to and are prepared to make a sacrifice for. How, I ask, can you conceive anybody feeling a warm sentiment of Patriotism, or love of country, for such a place as, say, Moreton Island, or Tasmania, or Victoria, or even Queensland? Is it likely, judging from what we know of the history of mankind in the past, that there will ever be that strong feeling of personal attachment which would induce men to sacrifice almost everything in the world for Queensland, as against the rest of Australia, or for Tasmania, or even for New Zealand, which is, however, more isolated? If these two positions are admitted—I think they will be borne out by history—you will find that they lead to this conclusion, apart from the conditions laid down by nature: that the essential conditions of humanity will lead the people who live in Australia to feel a sentiment of attachment for their country, and to require that that country shall be not only something worth caring for, something worth defending and fighting for if necessary, but also something that will appear to the rest of the world a country worthy of regard. It will be to them something dis-

tinct from the rest of the world. But a mere section of a country like Australia cannot be permanently distinct in the eyes of the rest of the world, and I do not think that any feeling of Patriotism for an isolated section of this continent could ever be permanent. This argument also, which I may call the argument from humanity, leads to the same conclusion that there must be one Australian sentiment, one Australian people, and that as it is one land surrounded by the sea, without any natural divisions, so it shall be one people with one destiny. [Hear, hear.]

Therefore, I conclude that the political union of Australia is absolutely inevitable, that historical considerations and natural conditions point irresistibly to the conclusion that it will no longer be "a mere geographical expression," as Italy was said to be a few years ago. Of course, no one can be certain in dealing with such subjects, and one great doubt has been suggested, a doubt which many people hold to be a very serious one; that is, whether the European races can live in the tropics. Australia is partly tropical and partly extra-tropical, and if there is to be a division of Australia into more countries than one —that is in the sense of political divisions— it must be a division between the north and the south. There is no natural division between the north and the south, except that the sun comes down to the tropic of Capricorn, and then goes north again, as we say. There are no natural features dividing it. The central part of Australia, that is the great western interior, is almost homogeneous in character of soil, and to a very great extent in the character of its climate. From within a short distance from the Gulf of Carpentaria, to within a short distance from the Murray River, there are no natural divisions to be found. There is an unbroken tract of country with almost similar climate, varying a little in the extremes of heat and cold in the north as compared with the south. But supposing this continent should be divided in that way—the north from the south—without any natural boundary, the inevitable teaching of history again comes in and tells us that even if the people are cut apart, there being nothing to keep

them apart but purely artificial lines, there will be—unless the human race in Australia developes a different character from that which it has developed in the rest of the world—continual disagreements and fights between them. If that division takes place, as a necessary consequence there will be different political institutions in the northern and the southern divisions of Australia, and the probability is that there will be contention and fighting between them. It is, however, too far ahead for any one to speculate with any confidence as to what the result may be.

Notwithstanding the confidence with which some people assert that the European races cannot thrive within the tropics. I would ask: what is to become of the European races? The European races are swarming rapidly. Many of the grounds to which they used to find their way to make homes are closed, or there is very little room left there for more. Even the United States of America are beginning to think of restricting immigration; and the temptations to emigration to that country are not so great as they were. And while the population of Europe is by no means decreasing but increasing to a large extent, the new swarms which will be thrown out from that great human hive, will have to find a place somewhere. For my own part I do not think that we have any room in Australia that we can afford to give away to any other race than our own. At any rate, it is worth trying the experiment whether we cannot keep it for ourselves and preserve a homogeneous race within the limits of the Australian shores. I know that this is a matter upon which great difference of opinion exists, I know also, that we cannot fight successfully against nature. That is impossible. If nature says there shall be divisions of race in a country, it is utterly useless for us to say there shall not be, and it is equally useless for us to fix artificial divisions between a homogeneous people. We are no doubt very often in a great hurry to do things. I suppose we are no worse in that respect than the people of other parts of the world, but as rapid means of communication now enable us to travel great distances in a short time, we are apt to think that

the operations of nature ought to move more quickly than they do; and we are apt to look for results more rapidly than the stern laws of nature will bring them about. But they do not move more quickly. And we shall have to wait and see what will be the effect of the different laws as they come into operation.

I have only to add one or two words from the same point of view as His Excellency the Governor, on the question of Antarctic exploration. There is no doubt that the climate of Australia is affected to a very large extent—to what extent and in what manner we do not know—by the conditions prevailing at the South Pole; and I cannot help thinking that if there were one great Australian nation, they would consider that it was their business to know what are the conditions existing there which affect their welfare so much. But there is great difficulty in the way while the colonies are isolated. They all think it does not affect them as much as their neighbours, and the result is that nothing is done. For instance, it may be thought that Queensland is influenced more by the monsoons than by anything occurring at the South Pole, that Western Australia is influenced. not so much by what takes place there, as by the prevailing westerly winds blowing from the Cape, and so on. If Australia were one nation, I cannot help feeling that the sentiment would be general that it was not only to their material interest, but that it was their especial business, and the business of nobody else in the world, to find out all about the South Pole, especially that part of the South Polar regions which is opposite to us. It is not so many years ago that considerable whaling fleets sailed from Twofold Bay and Hobart. Old whalers may still be seen lying as hulks in the Derwent River, and although the whales cannot all be gone, still for some reason the trade has almost entirely disappeared. I have had opportunities of conversing with many people in Victoria and Tasmania on the subject, and they are of opinion that it is not at all likely that that part of the ocean is less rich or less prolific in fish than the Arctic seas. Moreover, there are important scientific problems relating to the magnetic

pole yet to be solved. The magnetic pole in the south has never yet been discovered. Its position, according to the best calculations made, is supposed to be about due south from here, in longitude 154°, only one degree east of us, and in latitude 75° I think. It would be very interesting to find that place—where the needle dips perpendicularly downward. The discovery of it might materially affect the safety of navigation in southern seas. The deviation of the compass is certainly a matter of immediate interest to every person who goes to sea on these coasts, and they are numerous. These are matters of immediate material interest to us, and I hope that the proposed Antarctic expedition, or some expedition of the kind, will proceed to those regions before very long. I do not think it is to the credit of Australia as a nation, or to our patriotic feeling, that we should be indebted to the enterprise of a Swedish gentleman to make this exploration for us in what we ought to consider our own seas. I hope, however, that, whoever inaugurates the expedition, they will succeed in making discoveries which will teach us much that we do not know, much that we ought to know, and much that will be of value to us to know.

I have digressed, perhaps, from the beaten path this evening, in referring to a somewhat unusual branch of geographical science. I trust that I have not trespassed beyond the lines to such an extent as to be inappropriate to a scientific society, or unduly referred to contentious matters. If I have done so, I ask pardon. I should be especially careful not to do so in the presence of His Excellency; I trust he will agree that I have not exceeded the proper limits. I have used the word "political," which, as I stated just now, is applied in many senses, and this is only one of many instances in which we find the English language deficient in words to express different shades of meaning. "Politics," in the sense in which Aristotle used the word, means the science of government, in the abstract discussion of which there is no room for party contests. For this reason, to a great extent, I think, a body of gentlemen with excellent intentions, who call themselves the Imperial Federation League,

have greatly impaired their usefulness, and caused their objects to be almost entirely misunderstood, by the unfortunate name they selected for their organisation. The word "Imperial" has many different meanings; the one in which they use it is not its ordinary one, and the result has been that the term is generally understood to mean something quite different from what they intended when they adopted it. In the same way, the term "political" may be open to objection. Political geography, however, in its true sense, I may be permitted again to say, is one of the most interesting branches of the science. It is a branch to which every explorer turns his attention. What would be thought of an explorer who went across Africa, for instance, and afterwards said he saw so many rivers, mountains, trees, and wild animals, but did not mention the tribes he met, or the forms of government he found existing among them?

I have chosen this subject for this evening because it was one to which my attention naturally has been turned by the events of the past few months—the future unification of Australia. And the considerations, to which I have invited your attention, looking at the question from a merely geographical point of view, have led me to the conclusion that the political unification of Australia is absolutely inevitable. Nothing can stop it, unless the operations of nature and the laws of our common humanity should be changed in the case of Australia—which I think is a most unlikely event to happen. I hope that that unification will be accomplished before very long, because I believe it will be good for us all. I trust that I may again not be trespassing in the arena of politics, if I conclude with a hope that we may all live to see the natural result of the causes which I have endeavoured to indicate, and to see the union of Australia in one great Commonwealth under Her Majesty. [Hear, hear.] I have only, in conclusion, to convey to your Excellency, on behalf of the Council of the Society, their warmest thanks for the cordial countenance and assistance you have given them during the past year, and, indeed, during all the time you have been in Queensland. I thank you, ladies and gentlemen, for the attention with which you have heard what I have

had to say, and I again express my regret that my numerous engagements have prevented me from placing my thoughts before you in a more connected and regular form. [Loud applause.]

Mr. W. H. Miskin, F.L.S., F.E.S., said: I have very much pleasure in moving—"That the thanks of the Society be accorded to the President for the very interesting address that he has delivered this evening, and that the same be printed in the proceedings of the Society." I am sure that the apology with which Sir Samuel prefaced his address, for not having followed the usual rule in regard to anniversary addresses—that is, giving a resumé of the geographical work of the various societies throughout the world—was quite unnecessary. I feel that the meeting has rather derived an advantage by the departure he has thought proper to make, in as much as otherwise we should not have heard such an able exposition of the application of geographical science to our immediate surroundings. [Hear, hear.]

Capt. W. C. Thomson said: It affords me infinite pleasure to second the motion. I have always felt deep interest in geographical science, especially in its application to Australia; and in reference to the proposed Antarctic expedition, I cannot help taking this opportunity of remarking, that a feeling has crept into the public mind which may be illustrated by the monkey using the cat to pull the nuts off the hot plate, and that this Antarctic expedition is only to test if it is worth while to establish whale fishing on a large scale. If we could disabuse their minds of that, I feel sure we would have more supporters—even from a scientific standpoint alone. One important point to be considered in connection with this matter is the change in our climate. This change has been discussed by able men many years ago, but lately the fact seems to have been lost sight of that the climate of Australia is gradually changing, not so much, I think, by the breaking up of the ice, as mentioned by Mr. Gregory, as by the oscillation or gradual change in the points of the pole. I am, therefore, inclined to think that magnetic observations, taken by an expedition such as that referred to by

Sir Samuel, would be of great service; and laying aside the advantages which might accrue from the whale oil, the matter would be taken up in Australia with hearty good will. [Hear, hear.]

The Hon. Secretary: I have much pleasure in supporting the vote of thanks to the President for his address, and call upon you to accord that thanks with acclamation. (Loud applause).

Election of Officers.

A ballot was then taken for the appointment of officers and councillors for the session 1891-92, which resulted in the unanimous election of the following gentlemen:—

President: Hon. A. C. Gregory, C.M.G., F.R.G.S.; Vice-President: R. Gailey, J.P.; Hon. Secretary: J. P. Thomson, F.R.S.G.S.; Members of Council: J. N. Waugh, M.D., W. H. Miskin, F.L.S., F.E.S., P. McLean, J.P., J. Irving, M.R.C.V.S.L., J. M. Brydon, J.P., C. B. Lethem, C.E., Captain A. J. Boyd, Captain W. C. Thomson, W. Castles, J.P.

Sir Samuel Griffith, after announcing the result of the ballot, said: I have much pleasure in vacating the chair in favor of my successor, Mr. Gregory, and I thank you, ladies and gentlemen of the Society, for the indulgence you have shown me during my rather inefficient tenure of office.

The Hon. A. C. Gregory, President elect, on taking the chair received the congratulations of His Excellency the Governor, the retiring President, and other members of the Society. He then said: Your Excellency, Sir Samuel, and ladies and gentlemen: I thank you very much for the honour you have done me. I esteem it a great compliment to be placed in the chair of this Society, more especially as I feel that I do not properly deserve it. There are many other members who have been more active in the cause of the Royal Geographical Society of Queensland, than I have been. At the same time I can assure you that the Society has always had my best wishes, and when I have had a few spare moments, I have endeavoured to do what I could to

conduce to its success. I again thank you for the honour you have done me. (Applause.)

APPOINTMENT OF TREASURER.

The HON. SECRETARY moved "That the Council be empowered to appoint one of its own members to act as Honorary Treasurer of the Society." He explained that the Council had not had an opportunity of selecting one of its members to act as Honorary Treasurer, but at the close of the Annual Meeting, the Council would meet and see who would be willing to undertake the duties.

Mr. D. RANNIE said he had much pleasure in seconding the motion. He thought an Hon. Treasurer should be appointed to relieve Mr. Thomson of the arduous duties of that position which he had so well fulfilled in the past.

Carried unanimously.

HONORARY AUDITOR.

Mr. A. STARCKE moved "That the Honorary Auditor, Mr. W. Weedon, be re-appointed, and that the thanks of the Society be accorded him for past services."

Seconded by Mr. P. McLEAN, and carried.

RETIRING OFFICERS.

The HON. SECRETARY in moving "That the thanks of the Society be accorded the retiring President and Council member," said :—This is a very pleasing duty, and I am sure the motion is one that you will all endorse with great cordiality. Sir Samuel Griffith has referred to his inability, owing to pressure of other duties, to give that attention to the Society which he would have liked to, but, although he has not been present at our usual meetings, or taken what may be termed an active part in the affairs of the Society during the year, I have to acknowledge with very great gratitude the able counsel and willing assistance he has

given me on many occasions, on matters pertaining to the welfare of the Society. Personally, as Hon. Secretary of the Society, I shall always remember with kindly feelings, Sir Samuel's tenure of office, and shall in future look back upon that period of the Society's life history with very great pleasure.

Mr. C. B. Lethem, in seconding the motion, said: I take this opportunity of expressing the pleasure I feel at seeing so many members and visitors present this evening. I hope we may take it as a good augury for our future progress, and that we shall see much larger attendances at our monthly meetings.

Carried unanimously.

The President having formally conveyed to the retiring President the thanks of the Society in terms of the resolution.

Sir Samuel Griffith said: Mr. President, your Excellency, ladies and gentlemen: I thank the Society for the thanks they have been so good as to accord to myself and the other retiring member of the Council. I observe by the ballot papers that we are both ineligible for re-election in consequence of neglect of duty during the past year. [Laughter.] I think really the thanks of the Society are due more to the continuing members of the Council, who have not rendered themselves ineligible for re-election through neglect of duty. As Mr. Thomson has said, although I have not been able to attend the meetings of the Society during the year, I have had the pleasure on many occasions of consulting with him on matters connected with the Society. To that extent I have endeavoured to do my duty. I thank you very much for the compliment.

Exhibits.

The Hon. Secretary said he desired to direct the attention of the meeting to a few objects of interest which would be found on the table. Those interested in geology would find there a very interesting volume on the Tertiary History of the great Cañon district of America—a magnificent piece of cartographic work. This, he was pleased to say, was, if not *the* first, one of the first

donations to the Society, being the gift of the retiring President, Sir Samuel Griffith, when formerly Premier of Queensland. Those especially interested in astronomy would find delineated upon a Planisphere, the Southern Heavens, the gift of the Government of Victoria. Captain Thomson had kindly brought in a very interesting relic in the form of a box made out of the "Investigator" tree, and containing a volume of Flinders' voyages.

The Honorary Secretary.

The President said: There is one thing we must not forget, and that is the services that have been rendered to us by our Hon. Secretary. [Hear, hear.] He has given a vast amount of his time, and brought a great amount of ability and knowledge to bear upon the various subjects he has had to deal with, and I am sure that you will all join with me in giving him a hearty vote of thanks by acclamation. [Loud applause.]

Mr. Thomson said: Mr. President, your Excellency, Sir Samuel, and ladies and gentlemen: I thank you very sincerely indeed for your expression of appreciation of my services to the Society. I have never looked forward for thanks for my services—I have simply rendered them as a matter of duty; and while I remain connected with the Society it is my full intention, even in the face of many obstacles, to endeavour to fulfil my duty to the best of my ability. [Applause.]

His Excellency the Governor.

The President said: There is one final matter which I have to recommend to your attention. That is, that we have to thank His Excellency for his kindness in attending here to-night and giving us his assistance in the business we have had to do. (Applause.) We all know that Sir Henry Norman has given his mind largely to the advancement of science, and I have no doubt that he will continue to support this Society with his countenance, as far as it properly within him lies. (Loud applause.) Sir Henry Norman, I have to tender to you the

thanks of the Society for your kindness in attending here this evening.

HIS EXCELLENCY replying, said: Ladies and gentlemen, I am very much obliged to you for thanking me for coming here to-night, if you think I ought to be thanked for what has given me great pleasure. I have been very much interested indeed by Sir Samuel Griffith's able address upon one of the most important branches of geography. I only regret that one has so many engagements in the evenings, that I have not been able to attend your monthly meetings. It would give me great pleasure to do so and to take part in any discussions that may arise on geographical matters. I trust that I shall be a better boy during the coming year and be able sometimes to attend your monthly meetings. [Applause.]

The proceedings then terminated.

GEOGRAPHICAL NOTES.

EUROPE.

Phosphatic Chalk in England.—Deposits of this valuable agricultural fertiliser have recently been discovered near Taplow, in the county of Buckingham. Phosphatic chalk is found extensively in the north-east of France and in the neighbouring province of Hainaut, in Belgium, but it has not hitherto been found in England. Its value to the British farmer is so great that 40,000 tons are annually imported from France and Belgium. The deposits near Taplow occur in the cretaceous formation, in a section composed as follows: —Lowest stratum, flint-bearing chalk; above that, a band (8 feet thick) of brown phosphatic chalk; then 13 feet of flintless chalk; then a second band (4 feet thick) of brown phosphatic chalk, above which come tertiary strata. On analysis it is found that this brown phosphatic chalk is a purely organic deposit, consisting partly of shells of *foraminifera* and cretaceous molluscs, partly of the bones, teeth, and scales of little fish, which had probably been devoured by larger ones, and partly of the exuviæ of fish. The phosphatic chalk found near Taplow is considered to be equal in quality to that obtained from France and Belgium, which it closely resembles, and it is believed that further discoveries of it will yet be made in the chalk country of the south of England.—*The Scottish Geographical Magazine*, July, 1891.

New Base-line for the French Triangulation.—During the summer of 1890 a new base-line was measured on the site of the old base of Picard. As one of the terminations of this line has been built over, two new points were chosen, the northern one 200 metres to the north of the intersection of the Fontainebleau road with the road from Versailles to Choisy-le-Roi; the southern to the north of the hamlet of Fromenteau, at the intersection of the Fontainebleau road with that from Fromenteau to Athis. After two measurements, the length was found to be 7226·792 metres, and the error was probably less than a centimètre. This measurement agrees exactly with the base of Delambre, between Melun and Lieusaint; but if the lines of junction with the triangulations of England, Belgium, France, and Spain

be calculated from this base, constant differences are found, amounting in the first case to ... of the base.—*Ibid.*

The German Census. On December 1st 1890, the census of the German Empire was taken, and on that day the number of the population (including 2086 in Heligoland) was 49,420,972. The increase during the last five years (exclusive of Heligoland) was 2,565,268, or 5·47 per cent. Hamburg is the State which has received the largest addition to its population, the ratio being 20·36 per cent.; while in Mecklenburg-Strelitz there has been an actual decrease of 393 persons. The Prussian Monarchy contains 29,957,302 inhabitants; then follow Bavaria with 5,589,382, Saxony with 3,500,513, Wurtemberg with 2,035,443, Baden with 1,656,817, and Alsace-Lorraine with 1,603,987. Each of the remaining States has a population of under one million.—*Ibid.*

The Commerce of Germany with its Colonies.—*Le Tour du Monde* gives some figures extracted from the *Statistique de l'Empire Allemand.* The imports from West Africa (Cameroons, Togo-land, etc.) are valued at £218,160; from East Africa at £12,800; and from the colonies in the Pacific (New Guinea, Bismarck Archipelago, Solomon and Marshall Islands) at £500. The total is, therefore, £231,460. The goods exported by Germany to these colonies are valued at £249,236. Of this sum £208,240 represents the exportation to West Africa, £13,548 to East Africa, and £25,448 to the Pacific. The most important of the goods imported into Germany are coco-nuts, *copra*, vegetable butter, caoutchouc, and palm oil. Gunpowder, hardware, and brandy are exported to East Africa, and coal is sent to West Africa in exchange for ivory and coffee.—*Ibid.*

ASIA.

The Indian Census.—This census was taken on February 26th by nearly a million of enumerators. The population was found to be nearly 286 millions, of whom 220½ millions live in British territory, and 65½ millions under feudatory governments. The increase during the past decade has been 26 millions, or 29 millions if newly acquired districts be included. The density of population is 474 to a square mile in Bengal, 442

in the North-Western Provinces, and 248 in Madras. In Sind the growth of population has been very marked, amounting during the decade to 18¾ per cent. Burma has also made rapid progress, owing to the abundance of land ready for new settlers. The increase of population is 22¾ per cent., and Lower Burma is now as densely peopled as Portugal. As regards the towns, Calcutta now stands first and Bombay second, but changes in town areas and errors in the preliminary report render it impossible to give an accurate comparison of urban populations at present.—*The Scottish Geographical Magazine*, July, 1891.

The Population of Japan.—The *Chamber of Commerce Journal*, May 11th, states that at the commencement of 1889 the total population of Japan amounted to 39,607,234 persons, 20,008,445 being males, and 19,598,789 females. The increase over the population of the preceding year was 537,543, but from this number must be deducted the 117,648 persons omitted in the former census. The average density for the whole empire is 401 to a square mile. The district of Tokio is the most thickly populated, the number of inhabitants to the square mile being 536, while Yezo has only 1·1 to the same area. The town of Tokio contained 1,313,299 inhabitants on January 1st 1889. Then follow, in order of size, Osaka, Kioto, Nagoya, and Yokohama, the last having 119,783 inhabitants. —*Ibid*.

GENERAL.

Milk as a Vehicle of Disease.—In a valuable and instructive paper read before the Auckland Institute, New Zealand, 27th October, 1890, entitled :—"Milk as a Vehicle of Disease," Dr. Roberton says "that much preventible sickness is due to the use of a bad quality of milk is certain, and it may also be regarded as decided, that milk may be the means of transmitting diseases of a specific nature, such as fevers, typhoid, scarlatina, measles, and diphtheria ; also, tuberculosis or consumption, and possibly leprosy." The diseases caused by means of milk, he considers under two heads : (1) derangements of digestion due to a bad quality of milk consumed ; (2) specific infectious diseases. Digestive disturbance in children is caused by the consumption of fermented milk that irritates the stomach and bowels. If kept free from the action of germs, milk remains good, and, although germs must enter it if exposed to the air, still the

probability of a sufficient number of the kinds necessary to cause harmful fermentation, getting access to it is much lessened if only cleanliness is observed in connection with the operations of milking, distributing and storing the milk. The ills resulting in children from the use of fermented milk, are to be avoided, in the first place by cleanliness by seeing that the teats of the cow, the hands of the milker, and all utensils through which the milk passes, are thoroughly cleaned. The water used for that purpose should be such as fit for man to drink. Cans for the conveyance of milk should be dust-proof, and so should the vessels be in which the milk is kept after reaching the consumer. Where doubt exists, the consumer should boil the milk before use. It is doubtful if the digestibility of milk is in any way impaired by boiling. The prevention of harm to children in the manner indicated, lies to a very great extent in the hands of consumers, who, while practising thorough cleanliness themselves, should insist on being supplied with milk free from dirt, and, in so far as they are capable of judging, entirely sound. For the sake of their trade, this will compel dairymen and dairy-farmers to regulate the sanitary arrangements of their premises, and the methods of milking and distribution. Of the odious forms of infectious diseases caused by the consumption of impure milk, that known as tuberculosis, in Dr. Roberton's opinion, is to be most avoided. Not only is the magnitude of the evil caused by this disease represented by the death rate of from ten to fourteen per cent. of all deaths, but consideration must be taken of the suffering that precedes death, and the loss to the community from the impairment of the usefulness of the sufferers, and from the necessity of others having to nurse and attend to their wants. After an exhaustive reference to experiments made on infected cows, Dr. Roberton says, "if, however, danger exists from the consumption of meat from such animals, the danger from using milk of tuberculosis cows is much greater. Meat is cooked, and the germs thus often perish; but milk as a rule, is used uncooked, and still more so its products, butter and cheese. It is possible by the inspection of a carcass, to tell if the meat is unfit for food, but milk infected by the *Bacillus tuberculosis* requires a minute microscopic examination, which, as a practical dairy test, is impossible. The udder of the cow is especially liable to be affected by tubercle; often while still "prime fat," and before any symptoms point to the general system being affected, the udder is so diseased that the milk drawn therefrom is a dilution of tubercular poison. By this means, one cow may disseminate the disease to hundreds of families, all ignorant of the danger they incur." In summing up, Dr. Roberton states, that it is proved that tuberculosis in man and in catttle are the same disease—due to the *Bacillus tuberculosis*, that the milk from a tuberculosis cow, especially if the udder is affected, is liable to contain the

germ of tuberculosis; that the use of food containing this germ, has been proved a means of infection, and that therefore, the use of milk from tuberculous cows is attended by serious danger. There is good reason for believing that the use of such milk is responsible for some of the tuberculosis in man, especially of its manifestations in children. In concluding, the author urges the necessity of placing dairies and milk-shops under the supervision of some public authority, and of the law demanding that precautions be taken to insure a pure milk supply. It is necessary to provide (1) "that cows whose milk is used for consumption by man should be free from disease;" (2) "that the sanitary arrangements of dairies and milk-shops, and their surroundings, should be complete;" (3) "that the water used for the cows should be good, and especially also that water intended for washing the teats before milking, and for cleaning the milk-cans and other dairy utensils, should be such as man might drink with impunity;" (4) "that there should be proper appliances for efficiently cleansing all utensils in which the milk is placed;" (5) "that during its distribution, the milk is kept from dust;" (6) "that all employed in dairies, or otherwise in the distribution of milk, should themselves be free from infectious disease, and should not come in contact with those thus affected."—*Transactions and Proceedings of the New Zealand Institute*, 1890, vol. xxiii, (sixth of new series).

MISCELLANEOUS.

The use of Granite in the United States has largely increased during late years, and the rock has now assumed an important position among the mineral products of that region. From a report by Mr. R. B. Porter it appears that the value of the granite produced in the United States during the year 1889 was 14,464,095 dollars, as against 5,188,998 dollars in 1880. The four most productive States at present are Massachusetts, Maine, California, and Connecticut, in the order named, but those showing the greatest percentage of increase over the returns for the year 1880 are Minnesota, New York, Delaware, and Georgia.—*The Scottish Geographical Magazine*, July, 1891.

On May 2nd, the Canadian Pacific Express reached Montreal, having crossed the continent from **Vancouver**, a distance of 2900 miles, in the

remarkably short time of 91½ hours. The passengers reached Vancouver by the *Empress of India*, which made the passage from Hong Kong in 514 hours 23 minutes, stops included. The letters brought by this route from Shanghai were thirty-two days in transit to London, and those from Yokohama twenty-five days, and they might have been delivered three days earlier had there been a steamer at New York ready to take them on at once.—*Ibid.*

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Cape River Gold Field, Queensland. (Report by W. H. Rands). *From R. H. Lawson, Esq.*

"Cosmos." Vol. X, Nos. 5-8. *From Professor Guido Cora.*

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MINERAL Resources of the United States, 1888. *From the Department of the Interior, U.S.A.*

MITTEILUNGEN der Ostschweizerischen Geogr. -Commer. Gesellschaft in St. Gallen. 1890-91, II–IV Heft. *From the Society.*

MONOGRAPHS of the United States Geological Survey. Vols. XV and XVI. Also Atlas to accompany Monograph on the Geology of the Quicksilver Deposits of Pacific Slope. By G. F. Becker. *From the Department of the Interior, U.S.A.*

NEW ZEALAND Crown Lands Guide. No. XI, 1891. Also Map of the Southern Alps, eastern slope of Mount Cook. *From S. P. Smith, F.R.G.S., Surveyor-General of N.Z.*

OCCASIONAL Papers of the Californian Academy of Sciences, 1 and 2. *From the Academy.*

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PROCEEDINGS of the Philosophical Society of Glasgow. Vol. XXI. *From the Society.*

PROCEEDINGS of the American Academy of Arts and Sciences. New Series. Vol. XVI. *From the Academy.*

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RECORDS of the Geological Survey of India. Vol. XXIV, Parts 1 and 2, 1891. *From the Director.*

REPORT of the Second Meeting of the Australasian Association for the Advancement of Science. Vol. II. *From the Association.*

REPORT of Mr. Tebbutt's Observatory, Windsor, New South Wales, for the year 1890. Also Results of Double-star measures at Windsor, N.S.W., during the years 1886, 1887 and 1888; also Observations of Phenomena of Jupiter's Satellites, at same place, in the year 1889. By John Tebbutt, F.R.S.A., &c.—Reprinted from the monthly notices of the R.A.S., Vol. L, Nos. 1 and 5. *From the Author.*

REVISTA de la Sociedad Geográfica Argentina. Tomo VII, Cuadernos LXXIII and LXXIV. *From the Society.*

REVISTA do Observatorio, Publicacào Mensal do Imperial Observatorio do Rio de Janeiro. Anno IV, Nos. 6, 7, 8, 9, 12 ; Anno V, Nos. 8, 11 ; Anno VI, Nos. 1-5. Also Esboco de uma Climatologia do Brizil. Por H. Morize. *From the Observatory.*

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SOCIETE de Géographie de Tours. Revue, Tome VII, Nos. 6-7, 1890 ; Tome VIII, Nos. 1-2, 1891. *From the Society.*

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THE National Geographic Magazine. Vol. II, No. 5 : Vol. III, pp. 1-204, 1891. *From the Society.*

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THE Royal Society of Queensland. Proceedings of the Annual Meeting, with Register of Members for 1890. *From the Society.*

THE Scottish Geographical Magazine. Vol. VI, Nos. 10-12, 1890 ; Vol. VII, Nos. 1-7, 1891. *From the Society.*

TIJDSCHRIFT van het Nederlandsch Aardrijkskundig Genootschap. Tweede Serie, Deel VII, Nos. 4-5 ; Deel VIII, Nos. 1-4. *From the Society.*

TRANSACTIONS and Proceedings of the New Zealand Institute. 1890. Vol. XXIII, (sixth of New Series). *From the Institute.*

TRANSACTIONS of the Royal Society of Victoria. Vol. II, Part 1 ; Vol. III, Part 1. *From the Society.*

TWENTY-FIFTH Annual Meeting of the Queensland Acclimatisation Society, for the year ending March 31, 1891. *From the Society.*

VERHANDLUNGEN der Gesellschaft für Erdkunde zu Berlin. Band XVII, Nos. 7-10, 1890 ; Band XVIII, Nos. 1-5, 1891. *From the Society.*

WEATHER Charts of Australasia, 1890-91. Also Meteorological Report for 1887. *From the Government Meteorologist of Queensland.*

WHAT Science and Commerce may gain from an Antarctic Expedition. By A. Morton, F.L.S. *From the Author.*

CONSTITUTION AND RULES

OF THE

QUEENSLAND BRANCH

OF THE

Royal Geographical Society of Australasia,

FOUNDED 1885.

Amended at the Annual General Meeting, July 6, 1891.

CONSTITUTION AND RULES

OF THE

QUEENSLAND BRANCH

OF THE

ROYAL GEOGRAPHICAL SOCIETY OF AUSTRALASIA,

FOUNDED, 1885.

Amended at the Annual General Meeting, July 6, 1891.

The Queensland Branch of the Royal Geographical Society of Australasia was formed at a meeting held at the Town Hall, Brisbane, on the 10th July, 1885.

This Branch of the Society adopts for its general government the Constitution of the Royal Geographical Society of Australasia so far as the same is applicable; with the following Rules for its guidance :—

Title.

1. "The Queensland Branch of the Royal Geographical Society of Australasia."

Interpretation—Society :

Whenever the word "Society" is used in the following Rules and Bye-laws, the same shall be read and construed to mean the Queensland Branch of the Royal Geographical Society of Australasia.

Objects.

2. The objects of the Society are—

A—General.

I. Scientific—The advancement of geographical science, the study of physical geography, and the exploration of Australasia, with the islands and seas adjacent thereto,

and to obtain information upon their physical features, fauna, flora, geological formation, &c.

II. Commercial—The study of commercial geography, natural and artificial products, and the manufactures of various countries.

III. Educational—The dissemination of knowledge of physical, commercial, and political geography amongst all classes, by means of public lectures and publications.

IV. Historical—The collection and publication of historical records of geographical interest, and of memoirs of men distinguished by the advancement of geographical science in Australasia.

B—SPECIAL.

I. The collection of material for the compilation of a reliable Geography of Australasia.

Constitution.

3. The Society shall consist of Ordinary, Corresponding, and Honorary Members.

I. Any lady or gentleman may become an Ordinary Member, subject to election.

II. Persons of distinguished scientific attainments, who have promoted the objects of the Society, may be elected Corresponding Members.

III. Honorary Members shall be elected from among such eminent persons as have rendered valuable service in the cause of geographical science.

Election and Privileges of Ordinary Members.

4. Every person desirous of admission as a member of this Society shall be nominated by two Ordinary Members; the nomination (to be in Form I of the Appendix) to be delivered to the Secretary in writing, and submitted to the Council at its next meeting, and at the next ordinary monthly meeting thereafter the name of such person shall be put up for election by ballot, and two-thirds of the members balloting shall elect.

5. Every person so elected, shall upon payment of his entrance fee and subscription, and signing the obligation book (to be in Form II of the Appendix) either personally or by some person duly authorised by him in writing so to do, become a member of this Society; and shall be presented by the Secretary with a copy of the rules.

6. The Ordinary Members of the Society have the right to be present and vote at all meetings of the Society; to introduce two visitors at the general or ordinary meetings upon entering their names in the visitors' book; but no visitor shall speak unless specially invited to do so by the Chairman. Each member to be entitled to receive a copy of the Society's official publications, and to have access to the library and other public rooms of the Society.

7. Any Ordinary Member is eligible to be an officer or member of the Council of this Society.

Election of Corresponding and Honorary Members.

8. The Corresponding and Honorary Members shall be elected under the same conditions as laid down in rule 4 for Ordinary Members. They shall be exempted from the payment of fees, and may exercise the privileges of Ordinary Members; except that they shall not vote or hold office or seat on the Council.

Government by Council.

9. The government of the Society shall be vested in a Council consisting of twelve (12) members including a President, a Vice-President, an Honorary Secretary, and an Honorary Treasurer, to be chosen annually, and elected by the Society as hereinafter directed. Three (3) members shall form a quorum.

Officers.

10. The officers of the Society shall consist of a President, a Vice-President, an Honorary Secretary and an Honorary Treasurer, who shall be chosen annually, and elected from amongst the members of the Council.

Property.

11. The Council shall have the management of the affairs and property of the Society, and the disbursement of the funds.

12. The whole of the property and effects of the Society of what kind soever shall be vested in the President, the Vice-President, the Honorary Secretary and the Honorary Treasurer for the time being, in trust for the use of the Society.

Election of President and Vice-President.

13. The President and Vice-President shall be elected by ballot, at an Annual General Meeting of the Society, and shall be eligible for re-election, provided that they shall not hold office for more than two (2) years successively. The President, or in his absence the Vice-President, shall preside at all meetings of the Society and of the Council, at which he may be present.

Election of Honorary Secretary and Honorary Treasurer.

14. The Honorary Secretary and the Honorary Treasurer shall be elected by ballot at an Annual General Meeting of the Society, and shall be eligible for re-election.

Election of Ordinary Members to the Council.

15. The election of Ordinary Members to the Council shall be by ballot at an Annual General Meeting of the Society. The three members who have attended the least number of meetings of the Council shall not be eligible for re-election.

16. The President or members of the general Council, or the Vice-President or members of the Council of any associated branch of the Society, shall, when present in Brisbane, be admitted to the meetings of the Council with the privileges of Honorary Members.

Duties of the Council.

17. The Council shall meet once in every month for the transaction of business, at such time and place as may be appointed. Special meetings of the Council may be convened at any other time on the authority of the President, the Vice-President, or of three members of the Council. Due notice of all Council meetings to be sent to each member.

18. The Council shall prepare an annual balance-sheet, and a report on the operations of the Society for the preceding year, for presentation at the Annual General Meeting.

19. No business shall be transacted at any meeting of the Council unless three members of the Council are present; in case of equality of votes, the Chairman shall have an additional or casting vote.

20. It shall be the duty of the Council to decide on the papers to be read at the monthly meetings, and to determine as to their publication, in whole, or in part.

21. Any member of Council personally interested in a question before the Council, shall, if requested to do so by the Chairman, withdraw during its consideration.

22. Any member of Council absenting himself from three consecutive ordinary meetings of Council shall be considered to have vacated office.

23. If, in the interval between two annual meetings, any vacancy in the Council occurs, as in the last preceding clause, or from any other reason, the Council may appoint some member of the Society to temporarily fill such vacancy until it is filled by election at the Annual General Meeting.

Duties of the Honorary Treasurer.

24. The Honorary Treasurer shall have special charge of all moneys and accounts, and shall see to the collecting of all moneys due to the Society, and shall submit quarterly to the Council a list of the names of such members as shall be in arrears with their subscriptions. He shall pay all moneys received into a bank account, to the credit of "The Queensland Branch of the Royal Geographical Society of Australasia."

25. All accounts due by the Society shall be approved by the Council before being paid, and all payments shall be by cheque, signed by the Honorary Treasurer, and countersigned by one of the Council members.

26. He shall prepare an annual statement of receipts and disbursements, to be audited by Auditors appointed at the

preceding annual general meeting. Any vacancy occurring in such appointment to be filled by the Council.

27. This statement shall be submitted, audited, to the Council at its meeting prior to the annual general meeting.

Duties of the Honorary Secretary.

28. The Honorary Secretary shall attend and take minutes of the proceedings of the Society and of the Council respectively, and see that all such minutes are entered in the several minute books, and shall keep a complete list of the members of the Society, with the name and address of each accurately set forth; he shall conduct all correspondence, and transact all the routine business; and shall have charge of all property, books, maps, papers, &c., and shall see that the same are properly recorded and catalogued.

Fees.

29. Ordinary Members shall pay £1 1s. entrance fee, and subscribe £1 1s. per annum, payable in advance, to the Honorary Treasurer, on or before the first day of the session.

30. A member may at any time compound for future annual contributions by the payment of the sum of £10 10s.

31. Members elected during the second half of the session (excepting the first session) shall pay half the usual fee for that year. No member shall be responsible for any expenditure beyond his annual subscription.

32. Any Ordinary Member who has not paid the year's contribution, during the currency of the year, shall be liable to have his name removed by the Council from the list of members of the Society: Provided always that written application for the same shall first have been made by or on behalf of the Treasurer: And provided, also, that the Council shall have power to restore the defaulter's name at his request, and after payment of arrears. No member shall be entitled to vote or hold office while his subscription for the previous year remains unpaid, nor be entitled to participate in the other advantages of the Society if his

subscription be six (6) months in arrears. At the meeting held in September, and at all subsequent meetings for the year, a list of the names of all those members who are in arrears with their annual subscriptions shall be suspended in the meeting room of the Society. Members shall in such cases be informed that their names have been thus posted.

Session.

33. Session shall commence in the month of July, and last eight calendar months.

Meetings.

34. The meetings of the Society shall be—

I. Annual general meeting.

II. Ordinary monthly meeting.

III. Special general meeting.

35. The annual general meeting shall be held at the commencement of every annual session in the month of July, on a day to be fixed by the Council, to receive the President's address and the report of the Council on the state of the Society, and to discuss such subjects as may be brought forward relative to the affairs of the Society, and to make the elections for the ensuing year. If after the lapse of fifteen minutes less than ten members are present, it shall not be lawful for the meeting to proceed to business, except for the purpose of adjournment, and the meeting shall stand adjourned until a day and time then resolved upon.

36. The ordinary monthly meetings of the Society shall be held in each month of the session, on such days and at such place as the Council may appoint. The business shall be conducted in the following order, unless otherwise decided—

I. Announcement by the Chairman of the names of visitors present.

II. The reading and confirming the minutes of last meeting.

III. Balloting for new members.

IV. Signing of obligation book by new members.

V. The Secretary shall announce any donations made to the

Society since its last meeting, and read any special communications.

vi. Motions, of which notice has been given, to be considered, and notices of motion for the next meeting to be read.

vii. The consideration of any special subject which members may desire to bring forward, provided it be approved by the Chairman.

viii. Any paper or subject notified in the circular shall then be read.

ix. The Chairman to invite discussion.

x. Notice of papers for next meeting.

37. No motions relating to the government of the Society, its Rules or Bye-laws, the management of its concerns, or the election, appointment, or removal of its officers, shall be made at any ordinary monthly meeting.

38. Except as above provided, no paper shall be read at any meeting which has not been notified to and approved by the Council; and every paper read before the Society shall be the property thereof, and immediately after it has been read shall be delivered to the Secretary.

39. No motion of thanks to the contributor of any paper or lecture to the Society shall be allowed at the meeting. But every contribution to the Society shall be acknowledged with thanks by the Secretary by letter in a formal manner.

40. A special general meeting shall be called by the Council when considered necessary, or when required by the requisition in writing of any ten members to do so, the requisition to specify (in the form of a resolution) the purpose for which the meeting is required to be called; and at the meeting the discussion shall be confined to the subjects mentioned in the notice convening such meeting. Ten members shall form a quorum.

41. All meetings of the Society shall be convened by notice written or printed, sent by the Secretary to every member resident in the colony, at least seven days before the date fixed

for meeting. The circular shall state as far as convenient the subjects to be brought before the meeting.

42. The President shall take the chair at all meetings of the Society; or, in the event of his absence, the Vice-President; or, in the event of his absence, members present shall elect a Chairman, being a member of Council, if such be present.

43. No person shall at any meeting, unless with the express permission of the Chairman, address the meeting otherwise than in a standing position.

Intercolonial Meetings.

44. The Council may appoint a member, or members, to attend intercolonial general meetings when deemed necessary.

Retirement of Members.

45. Any member may, on payment of all arrears of his annual contribution, withdraw from the Society, by signifying his wish to do so by letter under his own hand, addressed to the Secretary. Such member shall, however, be liable to the contribution of the year in which he signifies his wish to withdraw, and shall also continue liable for the annual contribution until he shall have returned all books or other property borrowed by him of the Society, or shall have made full compensation for the same if lost or not forthcoming. Should there appear cause in the opinion of the Council to require the retirement from the Society of any member, a special general meeting shall be called by the Council for that purpose; and if three-fourths of those voting agree by ballot that such member shall retire, the Chairman shall declare the same accordingly, whereupon the name of such person shall be erased from the list of members.

Archives.

46. The archives of this Society shall be kept in Brisbane.

Quarterly Report.

47. A quarterly report of this Branch of the Society shall be published, and a copy transmitted to the Honorary Secretaries at Sydney for insertion in the annual proceedings of the Society.

Alteration of Rules.

48. Any repeal or alterations of the Rules, or additions thereto, of the Society, shall not be considered unless a written notice of motion, signed by not less than five members, shall have been given to the Council and read at three ordinary monthly meetings of the Society, and thereupon such motion may be brought forward at the next annual general meeting: or, if thought desirable, a special meeting may be convened before such annual general meeting to consider the resolution: and any resolution passed at such special meeting, altering or repealing the rules, shall be in force until the annual general meeting next following, and, if not then confirmed, shall thereafter be held void and of no effect.

Bye-Laws.

49. The Council shall have power to make Bye-laws for the conduct of its business and the business of the Society generally: Provided no such Bye-laws shall be repugnant to the objects of the Society, or to any Rules or Bye-laws made by the Society at any of its general meetings.

BYE-LAWS RELATING TO COMMUNICATIONS TO THE SOCIETY.

1. Every paper which it is proposed to communicate to the Society shall be forwarded to the Honorary Secretary for the approval of the Council.

2. The Council may permit a paper written by a non-member to be read, if communicated through a member.

3. In the absence of the authors, papers may be read by any member of the Society appointed by the Chairman or nominated by the author.

4. No paper or communication read before the Society, shall be published without the consent of the Council.

5. The Council shall decide, not later than at its meeting next following the reading of a paper, whether or not it shall be printed in the proceedings; and if not, such paper shall be returned, if desired, to the author

6. All communications intended for publication by the Society shall be clearly and legibly written on one side of the paper only, with proper references and in all respects in fit condition for being at once placed in the printer's hands.

7. In order to assure a correct report, the Council requests that the paper shall be accompanied by a short abstract for newspaper publication.

8. The author of any paper which the Council has decided to publish, will be presented with twenty copies; and he shall be permitted to have extra copies printed, on making application to the Honorary Secretary, and on paying the cost of such copies.

9. A proof corrected by the MS. shall be submitted to the author for revision.

APPENDIX.

Form No. 1.

THE ROYAL GEOGRAPHICAL SOCIETY OF AUSTRALASIA,

QUEENSLAND BRANCH.

CERTIFICATE OF A CANDIDATE FOR ELECTION.

Name,

Qualification or Occupation,

Address,

being desirous of admission into the Queensland Branch of the Royal Geographical Society of Australasia, we, the undersigned members of the Society, propose and recommend him as a proper person to become a member thereof.

Dated this .... day of 189

Form No. 2.

THE ROYAL GEOGRAPHICAL SOCIETY OF AUSTRALASIA,

QUEENSLAND BRANCH.

I, the undersigned, do hereby engage to observe the Rules and Bye-laws of the Queensland Branch of the Royal Geographical Society of Australasia as long as I shall remain a member thereof.

Signed,

Address,

Date,

PROCEEDINGS AND TRANSACTIONS

OF THE

Queensland Branch

OF THE

ROYAL GEOGRAPHICAL SOCIETY

OF

AUSTRALASIA.

7th SESSION,

1891-92.

EDITED UNDER THE AUTHORITY OF THE COUNCIL OF THE SOCIETY

BY

J. P. THOMSON, F.R.S.G.S., ETC., ETC.,

Honorary Secretary;

Honorary Corresponding Member of the Société de Géographie Commerciale de Paris, the Société de Géographie de Marseille, the Royal Scottish Geographical Society, the Manchester Geographical Society, and of the Sociedad Cientifica "Antonio Alzate," Mexico.

The Authors of Papers are alone responsible for the opinions expressed therein.

VOL. VII. PART I.

PRINTED FOR THE ROYAL GEOGRAPHICAL SOCIETY OF AUSTRALASIA, QUEENSLAND BRANCH,

BY

WATSON, FERGUSON & CO., PRINTERS, BRISBANE.

1892.

NOTICE.

All Donations presented to the Queensland Branch of the Society are acknowledged by letter and in the printed Proceedings of the Society.

N.B.—All communications to the Society should be addressed as follows:—

HONORARY SECRETARY,

ROYAL GEOGRAPHICAL SOCIETY OF AUSTRALASIA,

BRISBANE, QUEENSLAND, AUSTRALIA.

CONTENTS.

VOL. VII. PART I.

WATSON, FERGUSON AND CO., PRINTERS, BRISBANE.

FIRST ORDINARY MEETING.

SEVENTH SESSION.

THE first ordinary monthly meeting of the seventh session of the Royal Geographical Society of Australasia, Queensland Branch, was held in the Museum Library, Brisbane, on the evening of Friday, August 7, 1891, at eight o'clock. The Vice-President, Mr. R. GAILEY, J.P., occupied the chair.

ELECTION.—Ordinary Member: Mr. D. S. Thistlethwayte, C.E.

The HON. SECRETARY announced that the Council had duly appointed Mr. C. B. Lethem Hon. Treasurer of the Society for the current session.

Mr. D. RANNIE read the concluding part of his paper entitled, "Among the South-East Solomons."*

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* See abstract published in Vol. VI., Part II., p. 54.

SECOND ORDINARY MEETING.

Seventh Session.

The second ordinary monthly meeting of the seventh session of the Royal Geographical Society of Australasia, Queensland Branch, was held in the Museum Library, Brisbane, on the evening of Friday, September 4, 1891, at eight o'clock. The Vice-President, Mr. R. Gailey, J.P., occupied the chair.

In the absence of the author, the Hon. Secretary read the following paper:—

Some Remarks on the Island of Espíritu Santo, New Hebrides Group.

By Capt. J. Williams.

The most conspicuous, both in appearance and in historical association, of the New Hebrides Group is the island of Santo, named by the old Spanish navigator Quiros "Espíritu de Santo." Seen from seaward at a distance of about twenty leagues, it rises very abruptly from the ocean on its western aspect, presenting the appearance of a long, bold mountain range, whose culminating peaks in places attain altitudes of over 5,000 feet above sea level. From these numerous spurs radiate to the seashore, divided by deep gorges and narrow valleys, through which the tropical rainfalls are carried to the ocean. To the ethnologist the island of Santo offers many attractions to be found in no other island of the group; here man may be found in the most primitive condition. Far away in the interior, midst lovely glens, in the solitude of mountain fastnesses, dwell strange tribes of the human race, shut out from the gaze of civilised man, and cut off from intercourse with their coastal neighbours. There they live, the only indication of their existence being the numerous smoke columns that on windless, cloudless days are

projected skywards far above the hill tops. Conversing with the friendly coast tribes concerning these singular recluses, I was told that they were very numerous; no communication was held with them, and they never visited the coast Here is a virgin field for the anthropologist, only 1,200 miles from our shores—the social condition of a fragment of the great Aryan family, uncontaminated by the demoralising influences of the lower orders of civilisation. The old order of things is passing quickly away in the New Hebrides. The intrusion of European enterprise, calling forth the energies of missionaries and traders in the march of the Empire, is causing a change in the aspect of the more accessible parts of the island, that in the course of a few years will doubtless unfold the dark and hidden secrets of the interior of Santo.

It is not, however, of these I wish to speak particularly, but of the interesting people who inhabit some parts of the shores of the island, with whom I am acquainted. These are associated with customs unknown in other islands of the group. These obtain along the east coast from Cape Cumberland to the south end of the island, where human sacrifice is common at the decease of a married male member of the community. My first knowledge of this was obtained some years ago when, accompanied by my boatmen and an interpreter, I went on shore for the purpose of trading. There I observed an unusual demand for red paint, a large fat pig even being offered for an ordinary tobacco pipeful of this commodity. Being somewhat astonished at their eagerness, and knowing the usual value of paint amongst them, I inquired of the interpreter, who very reluctantly informed me that the paint was required to colour the faces of three young widows who were about to be executed, their husband having just died, and according to ancient custom the wives had to suffer death by strangulation. By the bestowal of a liberal gift, I succeeded in obtaining a view of the women. They were brought to the boats laughing and chatting with their friends, and apparently very happy and contented. I noticed they were decorated with wreaths around their heads, arms, and

waists. These were made of different creepers and variegated flowers. I told the interpreter to ask them to jump into the boat and I would take them off to the ship, so that it was quite unnecessary for them to be executed at all; but they were apparently quite resigned, for to all our persuasive eloquence they simply shook their heads and refused to move. Next day I made inquiries as to their fate, and was told they had been hanged during the afternoon. One intelligent native, who had seen life on a Queensland plantation, narrated the whole particulars to me. Instead of securing the end of the rope round the necks of the wretched victims, the two ends were placed over the branches of two trees some distance apart, leaving the middle of the rope hanging down. To this the necks were firmly secured, the ends being tightly pulled till death put an end to the misery of the victims. The bodies were then taken down and placed on a raised platform alongside the husband, there to lie in the seclusion of the bush till decay deprived the bones of their once beautiful covering. While anchored in different parts of St. Phillip's Bay, I frequently visited the villages on the coast, and found that the same custom prevailed, with some modification in the *modus operandi*. It was described to me that the wives were conducted to the last resting-place of their late husband in the bush; there they were blindfolded, and their mouths and ears stopped. After being laid on the ground, a brother or the nearest relative of the deceased husband seats himself on the victim's chest, seizing hold of the windpipe till life is extinct. The bodies are then placed on the platform. So accustomed are the females to look on this as a duty they owe their husbands, that cases have been known where the tribe have desired to save some particular wife from this fate, but she has taken her own life by hanging to a tree, probably near where her deceased husband was lying. As some of the chiefs and head men have as many as six wives, some idea may be formed of the number of women murdered annually. Does not this custom seem analogous to the "Suttee" practised in India, only modified to its present form? It is a question in the origin

of these people whether they are descended from the same stock as the Hindoo. Perhaps, in the early ages of the world, this chain of islands, then a continent, was joined to Asia, and these people were driven south in the glacial period; then, owing to great changes in the earth's surface, they were cut off from all communication, and owing to their isolated condition and surroundings they have degenerated into their present condition. The physical appearance of these natives on different parts of the islands is difficult to understand. There are no serious climatic differences to account for it (the island is only about 80 miles long), yet on the east coast, in St. Phillip's Bay, and among the small islands that fringe the coast, the natives are of magnificent physique, frequently standing six feet high, and superbly built, black as jet, and no sickness to be seen amongst them. The inhabitants of the west coast, and also most of the "bushmen" that visit that side, are usually poor specimens of humanity, some almost fragile in appearance, and their skin of a lighter colour, and by no means so savage-looking in appearance. On one occasion, when going on shore at a village called Palier, on the west coast, I noticed among a crowd of natives who welcomed us a magnificent specimen of a savage; standing among the others, he appeared a giant. I was certain at once that he did not belong to this part of the island, and on questioning some of the men who stood round, I was informed he belonged to Taggus, on the eastern side. He had formed part of the crew of a French cutter which had been captured here, and the crew murdered. From a few words spoken by the giant during the fight, some of the old plantation hands recognised him as one of their own countrymen, and saved his life. He appeared to have no wish to return, having married into the other tribe. The customs of the natives in some things are similar to the Torres Islanders, with this difference: here there are large villages built, and a fence divides the men's quarters from the females', but the females belonging to each man live together in one house. The males cook their own food and eat together, the females doing the same. Pigs constitute almost their sole

wealth; one particular breed, which has tusks almost round growing out of the jaw, are especially valuable. These are the pigs that are killed at their big feasts, when a man is raised to the dignity of a chief. At some of these "sing-sings," as they are called, as many as three hundred pigs are killed, and their jaws, with the tusks in, are carefully preserved. These feasts are usually given by men whom the tribe delight to honour. They are always wealthy men; they own great numbers of pigs. I learnt from conversing with men who have been to Queensland that there are several grades or degrees of rank recognised among themselves. Each time a man is raised or promoted, he receives a new name, and has to conform to certain customs and regulations consistent with the particular rank he has arrived at. I was present when a party of men—about a dozen—were having their evening meal. I noticed that one man sat apart from the rest, and neither ate nor drank. On making inquiry, I was informed that he had lately been raised to a "big chief," and that it was *infra dig.* for him to eat in presence of anyone; he always dined alone. I saw hanging up in this chief's house the jawbones of the pigs killed on his elevation to his present rank. They were hung to the ceiling with a rope, and artistically arranged in a circle, with the tusks showing outside. There were some hundreds of them, and the man was evidently very proud of them. On Santo, as well as in most islands of the group, the females are bought from their parents by the husbands for so many pigs, the price varying according to the scarcity or abundance of the animals. On marriage, the wife has the two front teeth knocked out. A piece of wood is placed inside the mouth, and the teeth knocked out with a stone. It gives them a very unsightly appearance, but the custom is general along the east side of the island. Although the island is swarming with wild pigs, and hundreds are kept and fed in the villages, yet these people are confirmed cannibals. I have often heard the argument adduced that it is the craving for animal food that makes men cannibals, but certainly that reason does not hold good in this case. I saw an instance myself on

one occasion. Sailing along the east coast, I observed the smoke from a fire, and thinking it was a signal to the ship to send the boat in, I went myself to interview them. Judge of my surprise when, on getting to the beach, I found about one hundred natives—men, women, and children—sitting down, while close to them, on some rocks, a human being was laid on the points of stones, with a fire underneath. It was a ghastly sight, and, needless to say, I lost no time in getting into the boat again. Some of the natives, seeing me jump back so quickly, laughed and appeared to be highly amused. It was evidently a common occurrence with them. I made some inquiries of an interpreter as to who the victim was. He said the man had been no good, and the tribe had unanimously decided to kill him; but I suppose it was some unfortunate bushman who having strayed to the beach had been captured. During my last voyage I spent a considerable time on the west coast of this island, and visited several villages, also penetrating a few miles into the bush. I made inquiries about the decrease of the population on this particular part of the island, as several years ago they were very numerous, and appeared to me to have decreased fully 80 per cent. Several of the old Queensland hands told me that a great many had been poisoned, and an old man who lived a little way back in the bush was credited with the manufacture of the poison. I had already heard that poisoning was almost a profession on some of the islands, especially Ambrym, but it was the first intimation I had received that it was practised on Santo. The same day, after this conversation, I strayed away in the bush, following a track which led towards the hills. About three miles from the beach, I suddenly came to a small clearing, with a few small huts inside a low stone fence. Seeing only an old man, I stepped over the fence and made signs that I wanted a drink. Observing some cocoanuts, usually used for holding water, hanging from the branch of a tree, I attempted to take hold of one, but was immediately prevented by the old fellow, who appeared to be in a great state of excitement. He hastily removed them into one of the huts,

making signs for me to drink from a running stream close by. My curiosity being roused, and thinking I had discovered the old poisoner I had been told about, I endeavoured to force my way in and obtain possession of one of the cups. The old man, however, was equal to the occasion, and, possessing himself of a tomahawk, stood in the doorway and appeared determined to prevent me. After some parleying the native continually pointing to the nuts and shaking his head, he suddenly took hold of them and emptied the contents. I can only account for his evident reluctance to supply me from these particular nuts, that he was afraid of the consequences, knowing the ship was anchored off the beach. I was very anxious to obtain one to have it analysed.

Rumours have frequently been circulated that gold existed on the island, but I have never heard from a reliable or practical source that such was the case. Several people have prospected the gullies on the coast, but none, as far as I know, have penetrated the interior.

There are several good harbours on the south and east coast, where vessels can lie with perfect safety during the hurricane season.

THIRD ORDINARY MEETING.

Seventh Session.

The third ordinary monthly meeting of the seventh session of the Royal Geographical Society of Australasia, Queensland Branch, was held in the Museum Library, Brisbane, on the evening of Monday, October 12, 1891, at eight o'clock. J. N. Waugh, M.D., occupied the chair.

Elections.—Ordinary Members: Colonel E. D. R. Ross and R. Carr-Boyd.

A donation to the Society from Mr. A. W. Jardine, F.R.G.S., was announced and exhibited. This consisted of printed copies of the old journals of Commander Norman, the Hon. A. C. Gregory, Messrs. McKinley, Landsborough and Macdonald. It was moved by the Hon. Secretary, seconded by Mr. J. Fenwick, and carried unanimously, "That the cordial thanks of the Society be conveyed to Mr. Jardine for his most valuable donation." The author read the following paper:—

Customs and Superstitions of New Guinea Natives.

By E. G. Edelfelt, Fellow of the Anthropological and Geographical Society of Sweden, &c.

The title of my paper is rather an incorrect one I fear, as I only intend to deal with a very small portion of the New Guinea natives, viz., those of the Papuan Gulf or western district on the southern coast, within the British possession of the island.

From the general term of the heading, you no doubt expect my narrative to embrace different tribes, but if your expectations are in that direction, I am sorry to say that you are doomed to disappointment, for which I trust you will pardon me. I have

an intimate acquaintance with the Gulf people, and so far as I know, nothing very definite has been written concerning them and their customs; at least no paper has been contributed to our Society treating on the Gulf inhabitants, in my opinion the most interesting of all the Papuans. New Guinea, no doubt, is getting stale to a good number of people in Australia, but when we consider how little we really know of the island, which at one time was part of the Australian continent, our interest in it should be kindled anew for the benefit of those coming after us; for, before long, the traditions and customs of the aboriginal population of New Guinea will be things of the past—as in the case of the Australian aboriginals. Therefore, I appeal to all who value and appreciate past historical events to tolerate everything—even if given in ever so crude a form—that may be said and written of the New Guinea and Australian natives, so as to preserve for the benefit of coming generations the habits of the lawful and original owners and occupiers of the land which we now call ours.

Part of 1886, and the whole of 1887, I resided at Motumotu, a village situated at the entrance of Williams River, in the Papuan Gulf, in latitude 8° 12′ south and longitude 146° 10′ east. During my residence there, I had frequent opportunities of observing the superstitions prevailing amongst the inhabitants of the district and throughout the Gulf country, or Elema, as it is designated by the Motu tribe, the natives in and around Port Moresby, who annually visit the Gulf people for trading purposes, and take away with them every year tons upon tons of sago.

The Motumotu village has about 2,000 inhabitants, and the people throughout the district are beyond doubt, so far as physique is concerned, the finest lot of men and women as yet known to any European traveller in New Guinea. The average height of the men is 5 ft. 7 in., and it is not uncommon to see men there over 6 ft. high; and there is a grace and dignity in their bearing that I have not seen amongst any race of men, savage or civilised. Their average chest measure is 35 inches,

and all their limbs in symmetrical proportion. The women are equally well developed. In the features of the people, however, there is a strange admixture approaching Papuan, Malay, Hindu, and European ; many of them are exceedingly good-looking, if not handsome. They have mostly large soft-speaking eyes, full of expression and frankness, which is strongly indicated towards anyone known to them ; but they can also show the reverse to those of whose friendship they are not certain ; they are jolly and mirthful, and display much native witticism. They are very impulsive, and will create a disturbance without a moment's notice, and perhaps, in fact, frequently without the slightest cause ; but the next moment they might bring all the pigs in the village as a peace offering ; and they can strike a bargain with anybody. I have known many of them sit on my verandah a whole day arguing the price of two cocoanuts, and rather than give in their point, they would hide the nuts in some corner on my grounds, and perhaps appearing the next day again trying to sell them at their price.

They were, at the time I lived amongst them, expert thieves. They would steal all the bed-clothes off your bed while you sat in the next room, and even while talking to them ; they might see a knife or some other article on the floor, they will then move cautiously towards it and cover it with their foot, or throw their bag on it, and sit down to watch their chance to appropriate it. Sometimes they very cleverly move the article along with their toes, and in the twinkling of an eye—when one's attention may be attracted to something else, or they might purposely draw one's attention to some object or other—and standing on the one leg perfectly motionless, lift the article with the toe, bend the knee to such an acute angle that the foot at the back of the body will meet the hand and relieve the toes of the stolen article. If they at any time are discovered redhanded, they will pass it off good humouredly as a jest, and ask for a smoke in the bargain. As warriors, the Motumotuans have always been dreaded all along the coast eastward, as far as Port Moresby, and about thirty miles westward ; their warlike influence also extends a considerable distance

inland. At the time when the London Missionary Society's representatives took up their quarters at Port Moresby, the Motumotuans sent a message to them that they would come and kill the whole lot of them; but, fortunately for the missionaries, the threats of the Motumotu people were never carried into effect—no doubt policy on their part—for where they can see any future permanent gain, they are cute enough to take advantage of it.

They carry on an extensive trade in bartering sago and other articles of food, in exchange for earthenware pots, and such ornaments as their own district does not produce, such as shell ornaments for arms and necks, also plumage of different birds, especially the bird of paradise. These barterings are chiefly done with the Motu tribe who visit the Gulf country once a year, leaving their homes—which by the way are over 120 miles east from Motumotu—at the end of the south-easterly monsoon, which sets in about the latter end of October; they then return to their homes with the north-westerly monsoon, which as a rule prevails up to March, and sometimes into April.

In former days the Motu people used to remain with the Motumotuans for three or four months, but, since the advent of the missionaries at Port Moresby, most of the trading canoes return to their respective homes about Christmas, if by that time they have been able to obtain a full complement of sago and cocoa-nuts.

The Motumotu people generally proceed to Port Moresby and other Motu villages within a few days of the termination of the north-westerly monsoon. All available space in the canoes being loaded with sago, cocoa-nuts and betel-nuts, to be bartered away for earthenware pans, cutlery and other useful articles; and this event of the Motumotuans coming is always looked forward to by the Motu people with much anxiety, as by this time their food supplies are getting low.

At one time when on these expeditions, the Motumotuans made a practice of selling every article of food they possessed, and so had nothing left for their return journey; but to replenish their larder they plundered all the gardens on their way, and

even sometimes were so bold as to kill pigs—this pilfering always being done under arms. Now, however, these highway robberies are not so frequent as in former days, because the people have had impressed upon them, by the missionaries and others, the necessity of keeping sufficient food to take them back to their homes. Yet they have a great difficulty in obeying the voice of honesty, but rather incline to their natural bent of stealing.

Now I will describe the mode of trading.

About the time when the trading canoes are expected, the Motumotu people are on constant watch, and as soon as the sails appear within sight, the villagers embark in their canoes and go out some distance to meet them, and ascertain how many canoes are coming, what they have on board, and where they are going; for sometimes some of them go about twenty-five miles further west to Wailala and other villages. Should the Motumotuans consider the trading fleet too small, which likewise means a limited quantity of trade, and so perhaps only sufficient, they think, for the requirements of Motumotu, they will then by force take charge of so many canoes as they think they want, or those which have the best and most trade on board, and navigate the trading crafts into the village. If they cannot forcibly take command of the fleet, or part of it, they will try by some means or other to tranship some of the cargo into their own canoes, and coolly proceed to the village with it. So rather than go elsewhere with an incomplete stock of trade articles, the itinerant traders must submit even to a little rough handling, and anchor their canoes at Motumotu. These scenes are always done with the best of intentions, although in the affray broken earthenware pots occasionally occur, but any damage done in this way is always paid for, and the Motumotuans thoroughly enjoy the fun.

When the crafts are safely anchored, the travellers are met by their personal friends or intending purchasers, when a smoke, betel chewing, and exchange of news are indulged in for a little time, after which bartering commences in earnest.

All the pots and pans are exhibited on deck, or carried ashore and placed in systematic rows; on each utensil are placed pieces

of wood or sticks, according to the price the vendor puts on his article—one, two, or more as the case may be; each piece of wood of an equal size is equivalent to an ordinary bag of sago weighing from 80 to 100 lbs. when freshly made; larger pieces of wood on a pot means larger bags of sago. The intending purchasers and inquisitive on-lookers sit round watching the proceedings with much attention, and when prices are put on all the utensils the buyer walks in and selects his goods and takes the pieces of wood, the vendor keeping a corresponding number as a check, both tying their pieces carefully up; and so on until the whole stock is disposed of. Arm shells, birds' plumes and other ornaments and cutlery, are always sold privately, and fetch as a rule very high prices, as shell ornaments of every description are very much valued by all natives, in fact anyone possessing a good assortment of this kind of finery is considered wealthy.

Now that everybody has been supplied with articles of utility as well as articles for ornament, busy groups of natives can be seen in different parts of the river banks for several weeks, making sago to pay for the goods received. But, perhaps, while on the topic of sago making, it might be as well to describe the manner in which it is manufactured.

The sago palm, like most of the palm tribe, reaches its maturity in about seven years, but it is very rare in the Motumotu district that plants so young are taken for sago making, as there is an abundance of old palms for that purpose. The tree is cut down near the ground, divested of all fronds and other impediments, and dragged to the river bank or some near place where there is water, or it might be floated down to the village and so worked at leisure. The trunk is split open from end to end, or only half way, according to the quantity of sago the people wish to make, to the depth of the pith or fibry portion of the palm. The outside woody part, about four inches thick, is carefully scaled off all round with wooden crow-bars, the full length of the trunk; this process will expose the whole pith to view, but allowed to remain on the wood as that part is detached from the fibry mass, which in such manner is kept clean during

the working. One or two men will now seat themselves, one at each end, armed with an implement somewhat of an acute angle, and beat the pith into a pulp; and to the fibre of this pulp is attached the glutinous part of the palm called sago. The pulp is then subjected to a washing process by the women folk, in a contrivance consisting of two stout sticks, placed firmly in the ground in such a manner that they form a fork at the upper end, in which is placed the base, six or seven feet, of the costa or rib of the sago frond, which acts as a spout leading into a bark trough ; at the upper end of the spout the sago is manipulated in a kneading fashion, using plenty of water to allow the glutinous matter thoroughly to dissolve and so part from the fibre; all, except the latter which is thrown away, is running along the spout into the trough below, where the sago sinks to the bottom, leaving the water free to be thrown away when the trough is full, when a beautiful white mass of flour remains. This is now packed into bags and hung up to allow any surplus moisture to escape, and the sago is ready for commerce. The traders are then called, each counting his pieces of wood, butts we might call them, and bags of sago ; if the bags do not correspond with the butts or bits of wood, a disturbance is likely to take place—bows and arrows frequently coming into requisition.

The material for the bags is supplied by the cocoa-nut palms, the fibre cloth growing at the base of the fronds all round the trunk. The bags are strongly and neatly sewn together with bark cord, and will endure a great deal of wear.

During the process of sago making, the travellers are entertained by their personal friends or by those who bought goods from them; each family so indebted are in duty bound to keep the visitors in food during their stay—be it of long or short duration. But they generally sleep aboard their canoes. The first two or three weeks they only enjoy themselves in eating and drinking, and betel chewing; after which, the men set to fishing and canoe making for their return journey. As they have no canoe timber of any consequence in or around Port Moresby, they are

wise enough to take advantage of this opportunity on every visit to the Elema country.

When leaving Motumotu for their homes, they are well supplied gratis with cooked food for the journey, such as sago bread, dried fish, pork, cocoa-nuts, betel, lime and pepper; and, with all this aboard, they set out for their homes with glad hearts, knowing that they shall be able to rejoin their friends in a few days, if the journey is not attended with any mishap.

Another interesting custom of the Motumotuans is when their youths are initiated into manhood; that is, of being permitted to take part in everything that the elder male members of the community are doing. A boy in the Motumotu district has, up to the time of this ceremony, his hair closely cropped with the exception of two tufts, which are allowed to grow to any length. One is on the front part of the head, just over the forehead, the other is a little backward from the crown of the head. And instead of the usual bandage worn by the men to hide their sexual nudeness, the boys have only a kind of loose leaf-thread apron fastened under a waist-belt. At the age between fourteen and seventeen years, the boy has his head clean shaved, and great preparations are made by friends and relatives to gather food of all kinds previous to the boy's entering into the Elamo, a house which I will describe further on. After all the feasting is done, the boys are placed in this house for about eight or nine months, or until such time that the hair is grown into a beautiful shape all over the head, so that it can be tied back mop-fashion should they marry immediately on leaving the Elamo. During the whole period they are in the Elamo, they must not look upon any woman, mother, friend, sweetheart, or sister; if so, courage is supposed to lack them in their duties as men. And during this temporary seclusion, they sleep in a special place set apart for them for that purpose, and take exercise in the fresh air at night when the women are asleep, and receive the food from their male friends or relatives only. At intervals the hair is examined by the men to see if it is of the required length, and when the time of their probation has expired, another festival is arranged,

and the boys—or rather now men—are liberated, appearing with their hair nicely combed, decorated with feathers and gay-coloured flowers, and a clean newly dyed si or bandage in place of the apron they had when entering the Elamo.

The boys are carried down from the building one by one, on the backs of their elder brethren ; and each one so mounted, having in his mouth a piece of pork, a betel-nut, a piece of sago bread, a piece of tobacco, or some other article of food. A man standing at the door gives each boy a thorough good blow over the loins or back with an old germinated cocoa-nut. The boy never utters a word, but looks as solemn as though he underwent the most trying ordeal, and when landed on the ground, he is surrounded by friends old and young, of both sexes, and congratulated on all sides.

The girls on the other hand, when they are considered marriageable, are dressed up in their best and most showy finery ; the upper part of the body from the waistband of the petticoat to the very hair on the head, is painted with a reddish ochre mixed with pig's fat or cocoa-nut oil. The hair is cut short, and the face painted in various colours and designs, the head arrayed with feathers and flowers, the neck and arms bedecked with shell ornaments and scented plants of all descriptions. In this dressy state she does nothing for several months but beautifying and showing herself off, in the hopes of captivating some young herculean of the village; during all this time she is well fed and cared for by her women friends, gossiping from place to place. The hair is allowed to grow wild, that is, any length until she marries, when it is again cut off close to the scalp and never permitted to grow long again. The men, on the contrary, let their hair grow long or short at pleasure ; if long, they tie it up so that it forms a big mop on the back of the head. Both sexes cut off the hair to prevent vermin, or when in mourning.

Now, before I proceed any further, I will describe the Elamo mentioned in the preceding remarks. This house is an immense building, sometimes as long as one hundred feet, and about twenty or twenty-five feet wide ; the front end aspect

somewhat resembling an alligator's upper jaw. It is built on high substantial piles, the whole building being constructed of strong durable timber, mostly red mangrove. The edifice has, properly speaking, no walls but the thatched roof—which, by the way, is made of pandanus leaves—droops arch fashion, and so forms the side walls. The interior is equally devoid of partitions, except a compartment at the extreme end, where Semeses or Kadisus are located. On both sides throughout the entire length of the building, except what is occupied by the idols, are benches used by the men for sleeping. The ridge pole is supported from end to end by stout forked posts firmly fixed four feet in the ground. On these posts is hung all their wearing apparel and ornaments, when not in use by the owners; each man has his weapons handy in the thatch over the place where he sleeps; and in different parts under the roof are places having an extra stock of bows and arrows, spears, and so on. The second storey, or ceiling, is occupied by the young lads undergoing the probation ceremony. The building is solely used by the male population, no woman being allowed to enter its precincts at any time. The number of Elamos is according to the population of the male portion in the village; a woman of course must bring food to her lord and master if he does not go home and partake of it with his wife and family. Men, married and single, except perhaps of old men, sleep in the Elamo at all times; when they do sleep in the family house, it is only part of the night, and they will return to the Elamo before anyone is astir, because they are ashamed to be seen coming from the wife's house during the time they should have been in the Elamo. This is not from any delicate feelings or moral scruples, but because it is considered unworthy of a man to be lounging about his wife except at proper times and places; yet he is not unkind to his spouse, but treats her with great consideration, consulting her nearly in everything they do.

When an Elamo is erected, and before it is permanently occupied, some human life must be sacrificed, otherwise all the

boys undergoing initiation trials in the structure will not be strong and brave fighting men; therefore, during the time the building is going up, but most frequently when the structure is completed, an expedition will set out for the express purpose of killing someone, and sometimes several people are murdered to satisfy this superstitious belief; and to show the success on their return, they bring back the ears of their victims.

At the time my wife and I took up our residence in Motumotu one of these houses had just been completed, and an old chief of the name of Lai, a pretended friend of the missionaries, went into the hills and slaughtered thirteen innocent people; of some he brought back the ears, and even a few male generative organs. For every one so killed he had a knot in a cord suspended round his neck, and another string recording the number of days he and his party had been away; and on their return the opening feast of the Elamo took place, celebrating it by eating, drinking, and dancing. No human flesh is partaken of, because the Motumotuans are not cannibals: they scorn those who eat it.

This building has been designated by the Rev. Jas. Chalmers a sacred house or temple. I should be very pleased indeed if the name gave justice to the house in a very small measure only, but I regret to say such is not the case; during my seventeen months residence amongst the people who use these houses, I saw nothing justifying the name so bestowed upon them. It is merely a sort of club-house, exclusively set apart for the male inhabitants, a den of gossip and mischief-brewing from morning till night; and many murders of innocent men, women, and children have been planned in this so-called sacred house. The sacredness of the Papuans, through the whole island, exists in the Quixotic effusions of Mr. Chalmers only, and the sanctity of the building is a misnomer. Native women may be excluded from their precincts—I never saw any enter therein—but my wife was within frequently, and I had *carte blanche* all over the building; although, according to the Rev. Jas. Chalmers's own statement, he was refused this privilege on his visits to the Papuan Gulf.

Now we will proceed to their burial customs, which are much the same as practised by most primitive people. They dig a very nice grave, from three to four feet deep, near their dwelling houses usually, and sometimes line it with old canoe timber to prevent the sand falling in, for the soil is only loose black sand. The body is respectably wrapped up in a mat and lowered into the grave, which is now partially filled up with earth, and they then place pliable saplings a foot or so apart, bending them across the grave, so as to give it an oval shape, and the earth closely packed together. Sometimes the body, especially that of a man, is carried to the grave dressed in all the worldly goods he possessed when alive, which are put into the grave with the corpse, in such a position as to be viewed by the people. But before the body is finally consigned to mother earth, the ornaments are taken off and distributed amongst the relatives, chiefly the sons if the departed was a father, and daughters if a mother. Of course wife or husband, whoever may survive, can keep or part with the dead person's goods to anyone he or she chooses; this, however, will only hold good where the family is under age.

A part of a man's bows and arrows, and such like, are broken at the grave, and the fragments placed upon it as a mark of the man's inability to use them again. A similar custom is observed with a woman's cooking utensils and working implements, also her petticoat, or whatever she wore at the time of her death, is placed on the grave. For a time the grave is well cared for, planted with variegated foliage, and there are intervals of feasts given in the dead person's honour.

As soon as a death takes place in Motumotu it is immediately known through the whole village, as a peculiar wild wailing is set up by the friends and relatives who attended on the departed during his or her illness. These heartrending and dismal lamentations are indulged in till the person is interred; as soon as the body is under ground this loud and disagreeable weeping is discontinued, and the relatives prepare for mourning.

When the wife dies the husband shaves all the hair off his head, dispenses with his belt and si—his only garment of

decency—blackens the body and face, and adorns the arms with a kind of wicker-platted armlets and bracelets, and may also substitute a wicker waistband for the ordinary elaborately carved and painted bark belt. Round his neck he has a collar woven of fine bark threads, and a necklace made from white seeds gathered from a grass. For several days he does not show himself in public, but remains in his house or goes into the bush, where he believes he can communicate with the spirit of his dead spouse. He eats little, only a certain sort of vegetable stew and cocoa-nut water, until it is revealed by the spirit who caused the death, or how it came about; for they believe they cannot die from any natural cause, but that it is caused by some supernatural means, or by some person who can command the evil powers at will.

A widow is subjected to exactly the same customs: she leaves off her petticoats, and in place of them takes on a netted garment, which covers the whole body except the arms, from her neck to below the knees; it is not changed or even taken off for a single moment for several months, when the mourning garbs are discontinued by degrees. A woman might lay aside her netted dress and again attire herself in the petticoats, still the body will remain blackened, and the collar, grass-bead necklace, and platted arm ornaments will be worn. So also with the widower; he might, after a short time, use instead of the si a piece of cloth stuck under the waistband, falling down in front, to, in some degree, cover his nudeness, and continue to wear the mourning apparels for the upper part of the body; but he will not permanently take to his si until the time of mourning is fully expired, a time which I really could not find any limit to. But, strange to say, should any of the surviving parties marry again before the term of mourning has fully ended, the garbs to denote the partner's departure is still worn—a thing that would cause an immense amount of jealousy in civilised life. Should the wife leave the world with small children after her, they are taken care of by friends and relatives—a beautiful and noble deed of savages, full of many and various ridiculous, and to us

foolish, superstitions. For instance, when about to fight they pray to Kadisu (spirit), and pull their fingers; if they crack the battle will be unsuccessful, and the fighters in most cases will remain at home. If there is very little cracking, or none at all, they generally proceed to carry out their warlike feelings. Sometimes they take a strung bow, a man holding it by the string, chewing ginger and looking steadfastly at it, facing westward, or, as they call it, where the sun sets; praying in a low tone of voice to a spirit, and squirting on the sides and centre of the bow the chewed ginger mass, placing a shell on the bow, and swinging it to and fro over his head several times in succession. If the shell falls they generally go, but should it remain on the bow they abandon the idea of fighting. They also take a white shell, one that is usually held between the teeth of a warrior when fighting, and munching a piece of bark, using some incantations meanwhile, and looking steadily at the shell, squirt all over it and the hand, holding it by a string, swinging it in all manner of ways, using the magic strains in the meantime; then allowing the shell to stop slowly, during which time many names of renowned departed warriors are called. If the end of the shell turns to the sorcerer they go to fight, otherwise they do not.

When anyone wishes to cast an evil influence over another, a sorcerer is employed or consulted; he has pieces of ginger or some such strong plant, and the person to be operated on is sought out when asleep, and the ginger rubbed on him or her. The conjurer then puts it into a bamboo and places it in the sun, or in some place where it can always be kept warm, until such time that the spell has worked its evil purpose, which is supposed to be done by the aid of spirits. In this so-called evil doing the people firmly believe, so much so, that should a person know that he or she has been the object of a sorcerer's evil operations, that person is sure to work her or himself into an imaginary sickly condition, and so give triumph to the enchanter. Some person or persons are the cause of all ailments and deaths, and if the sorcerer should happen to use his fraudulent art in naming the culprit or culprits, he or they will meet their fate by

being killed sooner or later by the friends of the person who is supposed to have been conjured to death.

At the time my wife and I took up our residence in Motumotu, a kind of pleurisy epidemic prevailed along the coast, and eventually it also reached this village, and in less than two months carried off over three hundred people. Of course my wife and I were accused of bringing the messenger of destruction into their midst, and for this loud rumours were about that we—including the Polynesian teachers—should suffer death. On hearing this I spoke to the people, who adhered to the statement that we foreigners had brought the epidemic to them, but stoutly denied the report that they were going to kill us. But I told them, if they had any such intentions, to come at any time except at night, when we were asleep, that we might have an opportunity of defending ourselves. Some years previous small-pox had been raging amongst them very badly; many old people still carry deep pock marks in their faces, and an immense number of people must have died, for I was informed that big graves were dug and the dead bodies thrown into them in heaps. I asked them how that came about, and if there were any foreigners amongst them or in New Guinea at all, to which they answered no. They could see the force of the argument, but someone or something was still the cause of it, and they blamed a poor unfortunate sheep I had, that was killed to please them; but the epidemic raged as violently as ever. Now our two goats were blamed; these animals, however, lived it all out. Finally, they levelled their abuse and accusations against a large picture of Queen Victoria, which hung in our dining-room. Previous to the epidemic appearing, people came in from long distances to see this picture, and while they remained in the village the Motumotuans would bring them every day to look at it several hours at a time, and wonder how it was that we, British people, have a woman as our chief, as a woman cannot throw a spear nor use a bow and arrow, and therefore is useless for fighting. All these difficulties were satisfactorily explained away, but the harmless image of our gracious Queen became eventually,

instead of daily admiration as before, an imaginary destroyer of health and life, and they requested me to take the picture down; to this I did not concede, but they would never look at it again with the same simple awe-struck admiration as before the epidemic came about. These are only a few facts of the many superstitions indulged in by the Papuan Gulf natives, and in this fetishism is no small factor in the life of the Gulf inhabitants of British New Guinea.

As we know, it has been a custom, so far as history can trace back into the remote past, that the many sub-classes or races of the human family have always—at least with very few exceptions—looked up to something better than man himself. Most civilized races project their thoughts into the great beyond or unknown for their ideal god. Others again, whose imaginitive faculty has not reached this lofty pinnacle of creative power, cannot conceive of anything beyond the material of their daily environments, and so form their image of a god of the material at their hands, such as wood, stone, metal, or any such matter perceptive to their physical eye, in the form of human beings, fishes, birds, or animals of some kind. We have been, and yet are, in the habit of terming these people idol worshippers. This may be true from our point of view, but is certainly not so from the standpoint of a savage people. Just here I might be pardoned in asking, are we not as much idol worshippers as the uncivilised savages of Africa or New Guinea? In my humble opinion, most emphatically yes! Do we not worship ourselves individually? do we not bow down and worship money and other worldly possessions, to a far greater extent than anything else in our beautifully created universe? This is certainly the highest form of selfish and egotistic worship, and is looked upon by the All Seeing Eye as the greatest crime committed by us made in the image of our Master. I could say much on the subject of civilised idol worship, but that would be an encroachment upon our Society's prescribed rules I believe, therefore I must take you back to the primitive mode of idol worshipping.

It is a custom of the Motumotuans to make representations in wood of the renowned departed men in the tribe. These images are treated as counterparts or spirits of the dead men the figure is supposed to represent; hence, when they consult this image, they imagine they talk and receive wise counsel from the figure as they did when the man was alive, and they mostly act upon the advice so imparted to them.

As stated in the preceding remarks in this paper, Kadisu (spirit)—sometimes named after the man the image represents—is located in a special compartment in the extreme end of the Elamo, a dark and musty place indeed. The privileged man or sorcerer, who can converse with the idols, goes into this place and consults them on the subject upon which they wish to be enlightened. The idol's counsel is sought nearly on all topics concerning the tribe, war and so on. Kadisu (the idol) can produce illness, death and everything that is evil. He is the cause of wreckage of canoes, through being offended with some of the members aboard. The image is also consulted previous to the people setting out on a trading expedition, and, should anything happen to the fleet, woe to the man or men who urged on the journey; such man or men stand in imminent danger of being killed by those immediately concerned in the calamity.

The privileged men or sorcerers often get their revelations through dreams, which they cannot account for in any other way but as coming from Kadisu; and whatever their impressions may be when purported to come from him through direct consultations or dreams, they are always acted upon in a most careful manner. No woman is permitted to set eyes on the idol for fear of provoking his wrath; to let such inferior beings as women look upon him would mean destruction to the people; and many wonder how the idol came into my possession. It happened thus:—I, as a man, and several months resident amongst the people, had *carte blanche* wherever I pleased to go; and during my many rambles, I found one or two, or more, in every Elamo I visited. So I selected this particular one as having better workmanship than any idols I saw. I offered

a price for it to the leading men of the Elamo, but they appeared to be surprised at such request or suggestion of disposing of their pet idol. My negotiations extended over six months, and what in their estimation would be untold wealth, in the form of cutlery, tobacco, beads, looking-glasses, fish hooks, calico, &c., could not at the time induce them to part with their so-called sacred image; and after many renewed efforts to be the possessor of this heathen relic of a primitive race, I entirely abandoned the idea of ever obtaining it. But at the lapse of the sixth month, my servant, an African negro, called me one very dark night about 9.30 p.m. (my wife being away at the time), and informed me that the Bingais, as he called the Papuans, would sell the god for a certain quantity of trade. The principal men, two brothers, who claimed proprietorship over the idol, interviewed me and related the conditions under which I could obtain it; it is hardly necessary to say that I was not slow in closing the bargain, and the idol was brought to me the same night in the most profound secrecy, when the villagers were asleep; it was carefully wrapped up in, I believe, a dozen bark blankets; but before it was finally handed over to me, I had to pledge my word that, for at least three moons, I should keep it in a dark place, covered up that no woman, not even my wife, should be allowed to see it, nor to tell any one that I had it in my possession, lest something might happen to the people who had dethroned and discarded it. Nearly every day, until the pledged time had expired, the men concerned in the affair came and inspected the place where he was kept, and to see that I was true to my promise. At last, for fear that they might regret the bargain, I told them that I had sent it away to some British town; so in this way the matter ended.

The idol was exhibited in the Melbourne International Exhibition, 1888, and Mr. Lindt, who acted as commissioner in Melbourne for New Guinea, in his pamphlet says:—"Turning towards the left wall, there will be noticed among grotesque masks and shields, the figure of Semese—a name given to the idol in honour of a chief by that name—the great fetish of the

Motumotu tribe of the Gulf of Papua. How Mr. Edelfelt, who procured it, induced the natives to part with it is a mystery, for it is known that many travellers in that locality tried to buy the image, but invariably failed. This idol is rudely but cleverly carved, and arrayed in and bedecked with a profusion of native fineries." And, continues the pamphlet:—"The Rev. James Chalmers remarks in the chapter 'Among the Cannibals of the Gulf': 'Overhead, near the centre of the Dubu (Elamo), hangs the most sacred of all representations of Semese. Only old men have seen it, and various are the initiatory steps before it can be seen. I tried much to have a look, but innumerable excuses were made, and I had to leave without gaining that higher knowledge.' What Chalmers, the great traveller and friend of the natives, was not allowed to see, is now on view here in Melbourne; and it is to be hoped Mr. Edelfelt will tell us some day how he got possession of this relic."

Gentlemen, Mr. Lindt's desires in that direction have been fulfilled. I have now told you how I obtained possession of the idol Semese, the fetish of Motumotu. And, in conclusion, I will just mention that at one time I thought I had discovered traces of periods at which the Motumotuans paid homage to some obscene deity; for it was a custom, just a very short time prior to the mission influence extended to Motumotu, that the people at a particular time of the year, celebrated a festive occasion very much resembling similar ceremonies observed by the people throughout the whole of Europe, only two or three centuries back.

The ceremony in Motumotu consisted in that the people assembled on some open space of ground, usually on the beach near the village; here the men would arrange themselves into groups as an audience; the women then divested themselves of all their garments—at the best of times not very plentiful—but what little they had was laid aside for the time. In this nude state they would go through a series of dances, accompanied with suggestive obscene antics and gestures, and with improvised songs appropriate to the occasion. The men looking

on laughing, and making insinuating remarks urging the performers to act as absurdly and lewdly as they could; the more obscene, the more applauded by the men. This was carried on with short intermissions for several hours, when refreshments were partaken of, after which, it is supposed that promiscuous sexual gratifications were indulged in the whole night following.

In all its phases, the ceremony celebrated by the Motumotu people, is in all particulars identical with similar observances practiced in the phallic ages by our ancestors; still I am doubtful whether the ceremony so observed by the Papuan Gulf natives had the same meaning to them as it had to the people at the time phallic worship was general all over Europe. We know that the people of those times paid high tributes to the creative functions of man and animals, and even went so far, that when a maiden was about to be married she had to offer her maiden robe or virginity to the obscene deity by some unnatural artificial means. Anything of this kind has never been heard of in New Guinea, nor did I ever find any representations of a phallus. Sir William Macgregor thought he had discovered one in the vicinity of Bentley Bay, at the east end of New Guinea, but it turned out to be a stone pestle for pounding up betel-nuts for the use of old people.

FOURTH ORDINARY MEETING.

SEVENTH SESSION.

THE fourth ordinary monthly meeting of the seventh session of the Royal Geographical Society of Australasia, Queensland Branch, was held in the Museum Library, Brisbane, on the evening of Monday, November 16, 1891, at 8 o'clock. The President, the Hon. A. C. GREGORY, C.M.G., M.L.C., F.R.G.S., occupied the chair.

ELECTIONS.—Life Member: F. W. Hardcastle, J.P. Ordinary Members: A. W. Bucknell, C. E. Forster, A. C. Haldane, H. H. Harbord, C. R. Klugh, and A. B. McDonald, JJ.P.

A letter from the Royal Academy of Sciences, of Lisbon, was read, announcing the death of its Secretary, José Maria Latino Coelho.

MR. H. M. STANLEY.

The Hon. Secretary read from a Melbourne paper an account of the welcome tendered to Mr. H. M. Stanley at the Opera House, Bourke Street, by the Melbourne Branch of the Royal Geographical Society of Australasia, on his arrival in that city, on which occasion Baron Sir Ferd. Von Mueller presided.

The Hon. A. C. GREGORY said the Society might congratulate itself upon the visit of so eminent an explorer as Mr. H. M. Stanley to Australia, whether he visited Queensland or not. No doubt a great deal had been said about the way in which Mr. Stanley had carried out and conducted his explorations, but those persons who had had anything to do with exploring could understand that sometimes what might appear to be harsh behaviour was exceedingly lenient and kind treatment, when it was viewed in the light of the surroundings; indeed, such conduct might be absolutely necessary in order that a man should carry out the duties which he had undertaken. Of course Africa was a much more difficult country to work over than Australia, for here an explorer had simply to provide himself with all his necessaries and have as little to do with the natives as possible—in fact, the

less the better. But an African explorer had to conduct his negotiations entirely with the inhabitants. So long as his dealings were with large and powerful tribes he might get on very well, but when he came amongst small tribes his troubles began, and he might as well try to negotiate with a dingo. The explorer would be compelled to fight, whether he desired it or not. Mr. Stanley was to be congratulated upon the moderation he had shown in carrying out his task. (Hear, hear.)

The author then read the following paper:—

Universal Time Measurement.

By J. P. Thomson, F.R.S.G.S., Etc., Etc., Hon. Sec. of the Society.

The nineteenth century marks a period in the world's history, remarkable for great discoveries, inventions, and improvements; for almost marvellous developments in the arts of a boasted civilisation, especially in their application to the better organisation and regulation of the affairs of mankind, and in the obtaining of a wider knowledge of man's physical surroundings, their bearing upon his general character, and influence on his mode of thought. Hence it naturally follows that our early conceptions have, in consequence, undergone important changes by intimate association with the progress of applied science, especially in its connection with the manufacturing arts and the enormous resources of electricity. Notwithstanding these progressive conditions, it is somewhat remarkable that the method of time measurement belongs to a remoter age than that in which we live. This prolonged period of juvenility cannot surely be attributable to absence of variety in the various mechanical appliances in use as perfect timekeepers, nor can our adherence to the old-time notation be justified by the plea of utility. On the contrary, being conservative in our views, we are prejudiced against any proposed movement involving departure from old-time associations; from interested motives we stoutly oppose infringement of time-honoured rights, and endeavour to place all possible

obstacles in the way of scientific progress. This refers with remarkable applicability to the difficulty experienced during the past twenty years or so, in agreeing to the position of the prime meridian. and in the efforts of various nations to establish uniformity and unification in the measure of time.

At the International Statistical Congress, held at Berlin as far back as the year 1862, steps were taken to approach the Imperial Government of Russia, in the hope of inducing His Majesty the Emperor to favour the adoption of the Gregorian Calendar for the measuring of time throughout the Empire. At that time the attention of His Majesty's Government was occupied with the emancipation of the slaves, and, although an Imperial decree had actually been prepared for the purpose of giving effect to the suggestions of the Congress, the great social reforms prevailed, and the matter was allowed to lapse. In the opinion of the Congress uniformity and unification in the measure of time are of the greatest importance, even in their bearing on such matters as the assessment of births and deaths for every month of the year, meteorological observations, the date of the appearance of epidemics and their exact duration, for commerce and the several branches of industry, for railways, and for international purposes. These views were ably supported by Dr. Struve, who in 1870 read a paper on the initial meridian before the Imperial Geographical Society of St. Petersburg.* In 1881 the subject was discussed at some length by the International Geographical Congress at Venice; in 1883 by the International Geodetic Association at Rome; and by the International Meridian Conference, held at Washington in October, 1884. Active steps were also taken in 1888 by the Academy of Sciences and Geographical Society of Paris; the Royal Instituto lombardo di Science e Lettere of Milan; the Royal Academy of Belgium, and the Bologna Academy of Sciences,—who published papers and special circulars advocating the adoption of the universal calendar for civil usages. To this same end the said Geographical

* Struve (Dr. Otto) *O percom meridiane* in the *Geographicheskia Izvestia, etc.*, No. 1, March 15, 1870.

Society of Paris acted with great spirit and consistency, having, in the first instance, discussed a communication "On the general adoption of the Gregorian Calendar in its relation to the universal hour," and subsequently a second paper was received from the Chinese Envoy in Paris "On the Chinese Calendar *á propos* of the unification of the calendar," both of which were printed in the Society's Bulletin in 1888.* These and a special circular letter, addressed to all other geographical societies, appealed for support in advocating the unification of the calendar on scientific and practical grounds alone.

By this it should be understood that the object sought after on behalf of science does not embrace within its scope a design to dispossess the race of the material for recording and tracing the history of the past. The method adopted by civilised countries to determine the dates of movable feasts, and for civil reckoning, by the use of the solar and the lunar calendars, is sufficient to remove any doubt on that point.

At the Washington Conference, convened by the President of the United States of America in 1884, resolutions were submitted and adopted. These affirmed the principles of a system of universal time reckoning, and recommended the establishment of an initial meridian for longitude reckoning, a zero for reckoning time, and a unit measure of universal time.

The prime meridian recommended corresponds with the meridian of Greenwich.

The moment of mean solar passage on the anti-prime meridian is the zero of time.

The unit measure of time, called the universal day, is the interval between two successive mean solar passages on the anti-prime meridian.

The hours of the universal day are counted consecutively from zero to 24, beginning and ending at Greenwich midnight.

The result of the deliberations of the Washington Conference was embodied in a very able memorandum by Mr. Sandford Fleming, C.E., C.M.G., of Ottawa, and transmitted by the

* *Comptes-rendus des séances de la Société de Géographie*, 1888, pp. 218 and 307.

Govêrnor-General of Canada to Her Majesty's Colonial Office. The views enunciated in this memorandum having been concurred with by the English Committee on the Prime Meridian Conference, composed of the Astronomer Royal and others, copy of the same was transmitted by the Colonial Office to the governors of Her Majesty's colonies. It was with the view of obtaining information upon the subject that the Government of Queensland referred Mr. Fleming's memorandum to our distinguished President, the Hon. A. C. Gregory, who prepared an able report for the information of the Post and Telegraph Department.* It is with the object of affording an opportunity for its intelligent discussion that I endeavour to show in this brief and hurriedly-prepared note, now submitted to the members of our Society, how this colony would be affected by the adoption of the "hour-zone system" and the 24-hour notation.

In support of the "hour-zone system," it is advanced, and reasonably so, that the idea of separate and distinct local times is incorrect—that there is not more than one time in the whole universe. The system is one proposing to divide the whole circumference of the globe into 24-hour zones, the central line of each zone representing an hour meridian, each hour meridian being separated by 15° of longitude, and each successive zone being equal to an exact hour.

The difference between local reckonings and world time will in all cases be known; for instance, if Queensland time depends upon the hour-meridian of 150°, the difference between the local time on that meridian and world time will equal plus ten hours exactly. The system of hour-zone reckoning has proved highly satisfactory in Europe, Asia and America, where it has been in use for several years. In these continents the chaos of local times has to a very great extent been removed, so that in Japan, Central Europe, Great Britain, the United States, and Canada, the hours are struck precisely at the same moment, the only difference being in their local numbers. This harmonious

* An instructive paper upon the same subject was subsequently written by Mr. A. M'Dowall, Surveyor-General of Queensland, for the information of the Government.

method simplifies time measurement, by dividing the civil day into simultaneous parts and obviating fractional considerations. The other proposed modification is the abandonment of the old method of dividing the day into halves and the substitution of the 24-hour notation, a reform inaugurated chiefly by the American Society of Civil Engineers, and supported by eminent men of science in Europe. On the Canadian railways this system has been in use for the past four or five years, its results being highly satisfactory to both the State and the public.

Instead of dividing the Australian continent into sectional parts with separate meridians for each colony, it might be mutually advantageous to establish the meridian of 150° for the reckoning of time. By the general adoption of the hour-zone system depending upon this meridian for the whole of Queensland, New South Wales, Victoria, Tasmania, British New Guinea, and probably the southern and the eastern divisions of South Australia, the tedious and inconvenient complications liable to arise by the continuation of our present differential local times reckoning will be entirely obviated, the operations of our excellent intercolonial railway system will be greatly simplified, the cause of time unification promoted, and the common good of mankind advanced.

Under the present system of reckoning time in Australia, overland travellers from Brisbane to Adelaide are obliged to put back their watches seven minutes at Wallangarra to correspond with Sydney time; at Woodonga a further set-back of twenty-five minutes, to agree with the time of Melbourne, is required, and when the South Australian frontier is reached, the minute hand of the watch has to be put back another twenty-five minutes to correspond with the mean time clock at Adelaide. By the adoption of the "hour-zone system" these alterations will be entirely unnecessary; in these colonies mean time clocks would strike the hours precisely at the same moment, and every division of the day would be identical and simultaneous. Indeed the advantages of a standard of time for the eastern part of Australia, as Mr. Gregory rightly remarks in his report, are so

obvious that further arguments in support of its adoption are not needed.

To correspond with a standard time based upon the 2nd-hour meridian of 150° aforesaid, the present notation would require to be modified in the following manner, viz.:—The mean time clock at Brisbane would require to be about twelve minutes slower, the Sydney clock about five minutes slower, the Melbourne clock about twenty minutes faster, the Hobart clock about eleven minutes faster, the Adelaide clock about forty-six minutes faster, and the Port Moresby clock about eight minutes faster on local mean time than they are at present.

Concerning the advantages of the 24-hour notation and the practicability of its adoption in universal time reckoning, in so far as the Australian colonies may be affected, there should, we submit, be no reasonable grounds for doubt. The present system of dividing the day into ante-meridian and post-meridian hours has many disadvantages, which are becoming more apparent as the commercial and industrial resources of the world increase, and as our colonial settlement consequently progresses.

The method of designating the hours of the civil day by the letters a.m. and p.m., not only possesses many drawbacks, but the most serious complications may arise by mistakes in the use of these letters, involving loss of life, loss of property, and great inconveniences.

In the preparation of railway and other public time tables, the greatest safeguard against calamitous occurrences arising from improper use of the local hour, may readily be employed by basing the compilation upon the 24-hour notation.

Initial Meridian.—Notwithstanding the alleged unanimity of the delegates at the Washington Conference of 1884, the prime meridian question is apparently as remote from solution now as formerly. The conference agreed upon the adoption of the Greenwich meridian for universal purposes; but as the delegates were unable to commit their respective governments to any measure of a binding character, and as other countries whose wishes would require to be consulted in any movements of a

national character were not represented at Washington, the labours of the conference have failed to settle the vexed question.* Speaking broadly, the general opinion in Europe is in favour of the *statu quo* being maintained for navigation purposes; the feeling of astronomers, geodetists, and navigators being opposed to the unique initial meridian. But for use in geographical cartography, meteorology, physics, geology, the railway and telegraph services, a common initial meridian is a desideratum most important to our national progress.

Generally speaking, continental scientists, especially the scientific institutions of France, advocate the meridian of Jerusalem as the neutral basis for international purposes. An effort to settle this question was made at the Bath meeting of the British Association for the Advancement of Science, in 1888, by M. Tondini de Quaringhi, representing the Bologna Academy of Sciences. This distinguished savant submitted the following suggestions to the Mathematical and Physical Science Section of the Association:—"That navigators and astronomers being at liberty to go on using their own initial meridians, another truly international meridian be chosen for all other purposes for which the unification of time is required." "That, moreover, since the Jerusalem meridian has already the suffrages of scientific authorities, its appropriateness to serve as the universal initial meridian be seriously taken into consideration."

In a paper published in the Memoirs and Proceedings of the Manchester Literary and Philosophical Society, M. Tondini remarks "that the present Jewish calendar, reformed in the fourth century by Rabbi Hillel Hanassi, is based on the Jerusalem meridian," which Lieut. Conder has "determined by trigonometry to be in 31° 46′ 45″ N. latitude, and 35° 13′ 25″ E. longitude, taken at the dome of the Holy Sepulchre Church."†

Whether the initial meridian is to correspond with the meridian

*Names of States represented at the Washington Conference in 1884: Austria-Hungary Brazil, Chili, Columbia, Costa Rica, Denmark, France, Germany, Great Britain, Guatemala, Hawaii, Italy, Japan, Liberia, Mexico, Netherlands, Paraguay, Russia, San Domingo, Salvador, Spain, Sweden, Switzerland, Turkey, United States, Venezuela.

† Memoirs and Proceedings of the Manchester Literary and Philosophical Society, Vol. II, fourth series, pp. 87-88.

of Jerusalem or of Greenwich, let us hope that, in the interests of science, the current century will not be permitted to close ere this question is finally settled to the mutual satisfaction of conflicting interests.

Mr. Thomson added:—This question is still being debated by scientific institutions in various parts of the world, and I have brought the subject before this Society, because I think it is one especially suitable for our consideration. (Hear, hear.) I must express my regret that Sir William Macgregor, who was very anxious to be present to hear this paper, has been unable to attend, as he is, I am sorry to say, laid up with a severe attack of influenza. He is so bad, I learn from our Hon. Treasurer, that the arrangements he had made to take his departure for New Guinea at the latter end of this week will have to be modified For several years, when we were fellow officers in Fiji, Sir William took a great deal of interest in astronomy, and indeed in all scientific matters; and while in that colony he had a couple of very good astronomical instruments, which he was good enough to place at my service for the observation of the Transit of Venus in 1882. I am sure he would have taken great interest in the subject I have endeavoured to deal with in this paper. (Hear, hear.) I also regret that Mr. Mathieson, the Chief Commissioner for Railways, is unable to be present to-night; he is unfortunately absent from Brisbane on business connected with his department. Ladies and gentlemen, I have only to add my thanks for the attention you have given to my paper. (Applause.)

The Hon. A. C. Gregory said: Well, ladies and gentlemen, I think we must confess ourselves greatly indebted to Mr. Thomson for the excellent paper with which he has favoured us. It is one dealing with a most interesting subject. Before proceeding to discuss it, however, I must express my regret that Sir William Macgregor has been unable to hear it, as I am sure he would have been much interested. As regards this question of one universal time, we may first of all look back and observe how it has arisen. At the outset men very naturally took the

interval between the rising and the setting of the sun as their day; but they gradually found that the days varied in length according to the season of the year, and then they constructed sun-dials, which divided the time into pretty nearly twenty-four parts during the whole day and night. Different nations of course have had their different systems; the Jews had one and the Romans another, by which they divided the time into their various watches for military purposes, but their systems were based upon the same principle, for their mid-night was mid-day: that is, their starting point for each day was the sun noon. By-and-by chronometers came into use, and then it was found that the sun and the moon did not indicate that the year was divided into particular months—there was a variation. Then they had to start upon what is called mean time, which is the division of the whole year from the time that the earth passes the equinox until it reaches it again, which is divided into 365 days, each of which is divided into twenty-four equal parts; so that the whole period of the year is cut into equal parts. The astronomical days are not what are used for nautical purposes, but the nautical time would be very convenient to use, and to a great extent we have adopted it. Our clocks and watches start from the true mean time and not from the slower time of the sun's passage of the meridian. Sometimes we are consequently a quarter of an hour fast and sometimes slower, as there are four changes in the year, so it would be impossible even for a good Waterbury to be made to agree with the sun's movements, because his movements —or rather those of the earth—are so erratic, and the time-piece would be sometimes a quarter of an hour fast or slow. The chief difficulty in the use of nautical time is that it starts from twelve noon. This may do very well on board ship, but it would be far more convenient here, for instance, to start as we do from midnight. Then we come to this peculiar difficulty that we have adopted the astronomical time in Brisbane for the observatory, and in the same way in Sydney, Melbourne, Adelaide, &c., they take their time from the passing of the sun over the meridian of each particular place. In consequence, a person

travelling south by rail finds a difference in time in each new colony that he enters. This is very inconvenient, and the only method of obviating it would be to adopt the American system. They begin with their principal observatory as their starting point, and when they have travelled fifteen degrees west of that their watch has just gained one hour. As soon as they get to that point they change the time by one hour; and so the traveller simply reckons the time by his watch at say eleven o'clock instead of twelve. This is what they call the hour meridian, and it is adopted because it is easier to add or subtract, as the case may be, according as you are travelling east or west one hour than a few minutes. If we adopted a similar system the time would be the same right down to Melbourne, and such anachronisms as receiving in Melbourne a telegram dated something like an hour *before* it was despatched from Brisbane would be avoided. The message would show on its face the exact time occupied in transmission. But the best and easiest system to adopt would be that of the 150 degree meridian, which would mean exactly ten hours, and I think it would be a very good thing if this were done. I believe the Railway Commissioners in the several colonies have already taken steps towards getting an even time adopted in order to avoid these variations on the borders. (Applause.)

Mr. A. J. Boyd: How would it affect the change between here and the western boundary of the colony? You would have to travel 900 miles west before making the first ten hours change.

Mr. Gregory: At present we keep Brisbane time, and it is about twelve minutes fast; so the clocks would be set twelve minutes nearer the true time than they are now. The first neutral point on the 150 degree zone would be about Miles on the Charleville line. The line of the 150 degree meridian would go somewhere about Armidale, and pass between Sydney and Melbourne, and a little to the east of Tasmania. It would not disturb the times so as to be at all inconvenient as regards our various transactions. In America, for convenience sake, they make the change at the boundaries of the States as nearly as possible.

Mr. Boyd: It would not affect ships whose chronometers keep Greenwich time, would it?

Mr. Gregory: No; it would simply make our time ten hours fast. As to the question of changing the World's meridian, I look at it this way: England is the country which has the largest number of colonies, and her Nautical Almanac is a standard work, so that the meridian of Greenwich is more frequently applied to the maps than that of Paris or Berlin, or anywhere else. Then again it is important that you should have a thoroughly well-equipped observatory at whatever place you fix as the starting meridian. If you take Jerusalem, as suggested, you would still take its longitudinal meridian from Greenwich, so you might as well start from the latter place at once, especially as there is a splendid observatory already in existence there. Of course there are sentimental reasons for starting from Jerusalem, but it is a hard scientific and commercial question; and in such matters we have to leave sentiment alone. Well, ladies and gentlemen, this is the last meeting of our Society before the recess during the hot months, and we will not have another meeting before April next, unless there is anything special in the meantime, such as the arrival of Mr. H. M. Stanley, and in that case our Hon. Secretary will notify you. (Hear, hear.)

This brought the business to a close, and the meeting separated.

Reception to Mr. H. M. Stanley.

Mr. H. M. Stanley arrived in Brisbane by the S S. "Leura," on Monday, the 14th December, 1891, at 4.30 p.m. As soon as the steamer was hauled alongside Messrs. Howard Smith & Co.'s wharf she was boarded by the Hon. A. C. Gregory, C.M.G., M.L.C., J. N. Waugh, M.D., Capt. A. J. Boyd, Messrs. W. Castles, C. B. Lethem and J. P. Thomson, members of the Council of the Royal Geographical Society of Australasia, Queensland Branch. Mr. Stanley was met in the saloon of the "Leura," introduced to the members of the Council, and informally welcomed to Queensland by Mr. Gregory, President of the Society. Mr. Stanley, after acknowledging the hearty welcome, landed on the wharf and drove to the Belle Vue Hotel.

Immediately before commencing his lecture at 8 o'clock the same evening, Mr. Stanley was met on the stage of the Theatre Royal by the Council of the Society, and formally presented with an address of welcome. There were present, the Hon. A. C. Gregory, President; Mr. R. Gailey, Vice-President; Mr. C. B. Lethem, Hon. Treasurer; Mr. J. P. Thomson, Hon. Secretary; Capt. A. J. Boyd, Messrs. J. Irving, J. M. Brydon and W. Castles. The President of the Society said:—Mr. Stanley, on behalf of the Queensland Branch of the Royal Geographical Society of Australasia, I have great pleasure in presenting you with an address of congratulation on your arrival in Brisbane. Accept also my personal welcome, as I feel it a great privilege to meet the greatest of the explorers who has been engaged in the solution of the geographical problems of the great dark continent of Africa. To those who have only resided under the conditions of social refinement which have rendered the pen a more efficient instrument of control of human actions than were in the past the sword and its accessories, it must often be difficult to fully appreciate many of our actions as explorers when

brought into contact with uncivilised and savage races; and the only test which is available is whether the result be success. To you, Sir, this test has been often applied, and your great successes have given ample proof that your actions have been guided by a judicious policy and wise discretion.

The following Address from the Council was then read by the Hon. Secretary of the Society:—

"Brisbane, December 14, 1891.

"To H. M. Stanley, Esquire, D.C.L., L.L.D., &c.

"Sir,

"On behalf of the members of the Queensland Branch of the Royal Geographical Society of Australasia, we have pleasure in offering you a very cordial welcome on your arrival in Brisbane. We esteem it a very great honour to have conceded to us the privilege of taking part with our Australasian Geographic Confederation, and in joining with sister organisations in conveying to you the felicitations of this Society, under the distinguished patronage of the Queen's representative, on your return to civilisation after the successful accomplishment of a journey, undertaken through the African Continent, in the noble cause of science and humanity. We watched your movements with keen interest, and we admire the manly courage, determination, and heroism displayed in your triumph over the difficulties that beset you. On your arrival in this city—the capital of a colony the enormous resources of which owe their development so largely to the noble conquests made in the field of exploration and discovery—we recognise a befitting occasion to approach you with this modest token of our appreciation of the singular and exemplary qualities that have contributed to the success of the remarkable achievements in the cause of universal geography, that have rendered your name famous throughout the whole intellectual world. It is by the noble self-sacrifices made in the cause of Geography that commerce and all the natural sciences have been enriched. By these also British trade and the influence of civilisation have been extended to the remotest parts of the earth, adding to the happiness and prosperity of millions of

the race. To this end you have contributed munificently, and we join in the cordial wish that you and Mrs. Stanley may long live through unclouded years of happiness, enjoying the many distinctive attributes you have received for distinguished services in the cause of the science of Geography."

Here follow the signatures of the officers and Council members of the Society.

Mr. Stanley, in reply, said that when he met Dr. Livingstone in Africa he found him an old man, borne down not alone by the weight of years, but also of hardships and trials suffered in the cause of science and humanity. He admired and revered him, and he especially revered him, as he found that he was in all respects a superior man. Mr. Gregory, too, had proved that geographical explorations were the beginning of all commercial enterprise, and he was proud to meet Mr. Gregory. Mr. Stanley thereupon stepped up to our veteran explorer and warmly grasped his hand.

Mr. Gregory said: Mr. Stanley, in conclusion, let me again express my gratification in meeting you, and trust that when the exigencies of travel again require you to move onward, you will retain as pleasurable reminiscences of your visit to Brisbane as will certainly remain with us.

After this ceremony the members of the Council retired from the stage and occupied the Vice Regal box, while Mr. Stanley delivered his lecture on "How I found Livingstone."

GEOGRAPHICAL NOTES.

AUSTRALASIA.

Australasian Association.—The fourth session of the Australasian Association for the Advancement of Science opened at Hobart, Tasmania, on Thursday, January 7, 1892.

The proceedings were conducted under the presidency of His Excellency Sir R. G. C. Hamilton, K.C.B., Governor of Tasmania, who has closely identified himself with scientific progress in that colony for several years.

The Queensland Branch of the Royal Geographical Society of Australasia was under the distinguished auspices of His Excellency General Sir H. W. Norman, G.C.B., G.C.M.G., &c., Governor of Queensland, who was its sole representative to the Association.

The Geographical Section of the Association was happily represented by one of the distinguished navigators of the British Navy, who, in the early days of Australasia, had, in the capacity of an officer of Her Majesty's Admiralty, done signal service in surveying the coastal waters of Tasmania.

The following are the names of the office-bearers of Section E, Geography :—

President: Commander C. A. D. Pasco, R.N., F.R.G.S.

Vice-Presidents: E. A. Counsel, F.R.G.S. ; J. R. M'Clymont, M.A. ; Rev. J. B. W. Woolnough, M.A.

Secretary: F. M. Young, B.A.

Committee: Commander C. A. D. Pasco, R.N., F.R.G.S. ; J. P. Thomson, F.R.S.G.S., Hon. Sec. R.G.S.A., Q. ; J. Stirling, F.G.S., F.L.S. ; Dr. Hocken ; Baron Sir Ferd. von Mueller, K.C.M.G., F.R.S., &c., President R.G.S.A., Vic. ; A. C. Macdonald, F.R.G.S., F.R.H.S., Hon. Sec. R.G.S.A., Vic. ; G. S. Griffith, F.R.G.S, F.G.S.

The following list comprises the papers read in Section E, Geography:—

1. Presidential Address.
2. Report of the Antarctic Committee.
3. *Capt. W. Osborne Moore, R.N.*—Notes on a Magnetic Shoal near Cossack, W.A.
4. *J. P. Thomson, F.R.S.G.S., &c.*—Exploration and Discoveries in British New Guinea since the Proclamation of Sovereignty. (Read by His Excellency General Sir H. W. Norman.)
5. *Rev. J. B. W. Woolnough, M.A.*—Icelandic Notes.
6. *A. Mault.*—A Draft of the Great South Land.
7. *J. R. M'Clymont, M.A.*—The Influence of Spanish and Portuguese Discoveries on the Theory of a Southern Continent.
8. *Hon. D. Murray.*—Despatches from the Elder Exploring Expedition.
9. *Dr. Fraser.*—Volcanic Phenomena in Samoa in 1866.
10. *A. C. Macdonald, F.R.G.S., F.R.H.S.*—Life and Work of Sir John Franklin.

Throughout the session the meetings of the Geographical Section were well attended, and much interest was manifested in the papers read.

The next meeting of the Association is to be held at Adelaide, and after that at Brisbane.

GENERAL.

Orthography of Geographical Names.—The following communication, received from the Royal Geographical Society, is now published for the information of our members :—

ROYAL GEOGRAPHICAL SOCIETY,

1, Savile Row, Burlington Gardens, W.,

December 11th, 1891.

In 1885 the Council of the R.G.S., impressed with the necessity of endeavouring to reduce the confusion existing in British maps with regard to the spelling of geographical names, in consequence of the variety of systems of orthography used by travellers and others to represent the sound of native place-names in different parts of the world, formally adopted the general principle which had been long used by many, and the recognition of which had been steadily gaining ground, viz., that in writing geographical native names vowels should have their Italian significance and consonants that which they have in the English language.

This broad principle required elucidation in its details, and a system based upon it was consequently drawn up with the intention of representing the principal syllabic words.

It will be evident to all who consider the subject that to ensure a fairly correct pronunciation of geographical names by an English-speaking person an arbitrary system of orthography is a necessity. It is hardly too much to say that in the English language every possible combination of letters has more than one possible pronunciation. A strange word, or name, even in our own language, is frequently mispronounced. How much more with words of languages utterly uuknown to the reader.

The same necessity does not arise in most continental languages. In them a definite combination of letters indicates a definite sound, and each nation, consequently, has spelt foreign words in accordance with the orthographic rules of its own language.

It was, therefore, not anticipated that foreign nations would effect any change in the form of orthography used in their maps, and the needs of the English-speaking communities were alone considered.

The object aimed at was to provide a system which should be simple enough for any educated person to master with the minimum of trouble and which at the same time would afford an approximation to the sound of a place-name such as a native might recognise. No attempt was made to represent the numberless delicate inflexions of sound and tone which belong to every language, often to different dialects of the same language. For it was felt not only that such a task would be impossible, but that an attempt to provide for such niceties would defeat the object.

The adoption by others of the system thus settled has been more general than the Council ventured to hope.

The charts and maps issued by the Admiralty and War Office have been, since 1885, compiled and extensively revised in accordance with it. The Foreign and Colonial Offices have accepted it, and the latter has communicated with the Colonies requesting them to carry it out in respect to names of native origin.

Even more important, however, than these adhesions is the recent action of the Government of the United States of America, which, after an exhaustive inquiry, has adopted a system in close conformity with that of the R.G.S., and has directed that the spelling of all names in their vast territories should, in cases where the orthography is at present doubtful, be settled authoritatively by a Committee appointed for the purpose.

The two great English-speaking nations are thus working in harmony.

Contrary to expectation, but highly satisfactory, is the news that France and Germany have both formulated systems of orthography for foreign words, which in many details agree with the English system.

The Council of the R.G.S., by printing the Rules in *Hints to Travellers*, and by other means, have endeavoured to ensure that all travellers connected with the Society should be made aware of them; but as it is possible that some bodies and persons interested in the question may still be in ignorance of their existence and general acceptance. they feel that the time has come to again publish them as widely as possible, and to take every means in their power to aid the progress of the reform.

To this end, and with a view to still closer uniformity in geographical nomenclature in revisions of editions of published maps—a gigantic task requiring many years to carry out—the Council have decided to take steps to commence tentatively indexes of a few regions, in which the place-names will be recorded in the accepted form.

M. E. GRANT DUFF, *President.*

RULES.

The Rules referred to are as follows:—

1. No change is made in the orthography of foreign names in countries which use Roman letters: thus, Spanish, Portugese, Dutch, &c., names will be spelt as by the respective nations.

2. Neither is change made in the spelling of such names in languages which are not written in Roman character as have become by long usage familiar to English readers: thus, Calcutta, Cutch, Celebes, Mecca, &c., will be retained in their present form.

3. The true sound of the word as locally pronounced will be taken as the basis of the spelling.

4. An approximation, however, to the sound is alone aimed at. A system which would attempt to represent the more delicate inflexions of sound and accent would be so complicated as only to defeat itself. Those who desire a more accurate pronunciation of the written name must learn it on the spot by a study of local accent and peculiarities.

5. *The broad features of the system* are:—

(*a*) That vowels are pronounced as in Italian and consonants as in English.

(*b*) Every letter is pronounced, and no redundant letters are introduced. When two vowels come together, each one is sounded, though the result, when spoken quickly, is sometimes scarcely to be distinguished from a single sound, as in *ai*, *au*, *ei*.

(*c*) One accent only is used, the acute, to denote the syllable on which stress is laid. This is very important, as the sounds of many names are entirely altered by the misplacement of this "stress."

6. Indian names are accepted as spelt in Hunter's Gazetteer of India, 1881.

The following amplification of these rules explains their application :—

Letters.	Pronunciation and Remarks.	Examples.
a	*ah*, *a* as in *father*	Java, Banána, Somáli, Bari.
e	*eh*, *a* as in *fate*	Tel-el-Kebír, Oléleh, Yezo, Medína, Levúka, Peru.
	English *e*; *i* as in *ravine*; the sound of *ee* in *beet*. Thus, not *Feejee*, but	Fiji. Hindi.
o	*o* as in *mote*	Tokyo.
u	long *u* as in *flute*; the sound of *oo* in *boot*. *oo* or *ou* should never be employed for this sound. Thus, not *Zooloo*, but	Zulu, Sumatra.
	All vowels are shortened in sound by doubling the following consonant.	Yarra, Tanna, Mecca, Jidda Bonny.*
	Doubling of a vowel is only necessary where there is a distinct repetition of the single sound.	Nuulua, Oosima.
ai	English *i* as in *ice*	Shanghai.
au	*ow* as in *how* .. . Thus, not *Foochow*, but	Fuchau.
ao	is slightly different from above	Macao.
aw	as in *law*.	
ei	is the sound of two Italian vowels, but is frequently slurred over, when it is scarcely to be distinguished from *ey* in the English *they*.	Beirút, Beilúl.
b	English *b*.	
c	is always soft, but is so near the sound of *s* that it should be seldom used.	Celébes.
	If *Celébes* were not already recognised it would be written *Selébes*.	
ch	is always soft as in *church*	Chingchin.
d	English *d*.	
f	English *f*. *ph* should not be used for the sound of *f*. Thus, not *Haiphong*, but	Haifong. Nafa.
g	is always hard. (Soft *g* is given by *j*)	Galápagos.
h	is always pronounced when inserted.	
hw	as in *what*; better rendered by *hw* than *wh*, or *h* followed by a vowel, thus *Hwang ho*, not *Whongho* or *Hoang ho*.	Hwang ho, Ngan hwi
j	English *j*. *Dj* should never be put for this sound ..	Japan, Jinchuen.
k	English *k*. It should always be put for the hard *c*. Thus, not *Corea*, but	Korea.
kh	The Oriental guttural	Khan.
gh	is another guttural, as in the Turkish	Dagh, Ghazi.
l, m, n	As in English.	
ng	has two separate sounds, the one as hard as in the English word *finger*, the other as in *singer*. As these two sounds are rarely employed in the same locality, no attempt is made to distinguish between them.	
p	As in English.	
ph	As in *loophole*	Chemulpho, Mokpho.
th	stands both for its sound in *thing*, and as in *this*. The former is most common.	Bethlehem.
q	should never be employed; *qu* (in *quiver*) is given as *kw*. When *qu* has the sound of *k* as in *quoit*, it should be given by *k*.	Kwangtung.
r, s, sh, t, v	As in English.	
w	.. ..	Sawákin.
x		
y	is always a consonant, as in *yard*, and therefore should never be used as a terminal, *i* or *e* being substituted as the sound may require. Thus, not *Mikindány*, but	Kikúyu. Mikindáni.
	not *Kwaly*, but	Kwale.
z	English *z*	Zulu.
zh	The French *j*, or as *s* in *treasure*	Muzhdaha.
	Accents should not generally be used, but where there is a very decided emphatic syllable or stress, which affects the sound of the word, it should be marked by an *acute* accent.	Tongatábu, Galápago Paláwan, Saráwak.

* The *y* is retained as a terminal in this word under Rule 2 above. The word is given as

Tables Useful in Railway Construction.—We have been supplied by our member, Mr. Roger North, with the following tables in use in the Chief Engineer's Department, Queensland Railways :—

TABLE SHOWING GRADES REQUIRING TO BE USED ON CERTAIN CURVES TO MAKE THE REQUISITE TRACTIVE FORCE EQUAL TO THAT ON A STRAIGHT WITH A GRADIENT OF 1 IN 60.

Radius.		Gradient.
10 chains	... ...	1 in 75·08
12 ,,	... ...	,, 72·50
15 ,,	... ...	,, 69·73
20 ,,	... ...	,, 66·96
30 ,,	... ...	,, 64·39
40 ,,	... ...	,, 63·48
60 ,,	... ...	,, 62·18
80 ,,	... ...	,, 61·60

TABLE SHOWING GRADES REQUIRING TO BE USED ON CERTAIN CURVES TO MAKE THE REQUISITE TRACTIVE FORCE EQUAL TO 1 IN 50 ON CURVES OF 15 CHAINS RADIUS.

Radius.		Gradient.
5 chains	... ...	1 in 63·41
6 ,,	... ...	,, 59·07
7 ,,	... ...	,, 56·33
8 ,,	... ...	,, 54·40
9 ,,	... ...	,, 53·02
10 ,,	... ...	,, 51·95
12 ,,	... ...	,, 50·70
15 ,,	... ...	,, 50·00

TABLE SHOWING AREAS DRAINED BY CERTAIN SPECIFIED DRAINS, RUNNING ⅔ FULL, RAINFALL 1 INCH PER HOUR.

Size of Drain.	⅔ Sectional Area	Current per Hour in Miles. 1	2	3	4	5	6
		Areas Drained in Acres.					
0′ 6″ Pipe Drain*	·1309	·13	·26	·40	·53	·66	·79
0′ 9″ ,,	·2945	·34	·68	1·02	1·35	1·69	2·03
1′ 0″ ,,	·5236	·64	1·28	1·92	2·56	3·20	3·84
1′ 3″ ,,	·8195	1·04	2·07	3·11	4·15	5·18	6·22
1′ 6″ ,,	1·1781	1·53	3·06	4·59	6·11	7·64	9·17
1′ 9″ ,,	1·6035	2·11	4·23	6·35	8·46	10·58	12·69
2′ 0″ ,,	2·0944	2·80	5·60	8·39	11·19	13·99	16·79
1′ 0″ × 1′ 0″ Box Drain	·6600	·97	1·94	2·91	3·88	4·85	5·82
1′ 6″ × 1′ 3″ ,,	1·2500	1·82	3·64	5·46	7·28	9·10	10·92
2′ 0″ × 1′ 3″ ,,	1·6700	2·43	4·86	7·29	9·72	12·15	14·58
2′ 0″ × 1′ 6″ ,,	2·0000	2·91	5·82	8·73	11·64	14·55	17·46
3′ 0″ × 1′ 3″ ,,	2·5000	3·64	7·28	10·92	14·56	18·20	21·84
3′ 0″ × 1′ 6″ ,,	3·0000	4·36	8·72	13·08	17·44	21·80	26·16
3′ 0″ × 2′ 0″ ,,	4·0000	5·82	11·64	17·46	23·23	29·10	34·92
4′ 0″ × 1′ 3″ ,,	3·3330	4·85	9·70	14·55	19·40	24·25	29·10
4′ 0″ × 2′ 0″ ,,	5·3300	7·75	15·50	23·25	31·00	38·75	46·50
5′ 0″ × 2′ 0″ ,,	6·6600	9·66	19·33	29·00	38·66	48·33	58·00
5′ 0″ × 2′ 8″ ,,	8·9000	12·93	25·86	38·79	51·72	64·65	77·58
2′ 6″ × 1′ 0″ Log Drain	1·6667	2·42	4·85	7·27	9·70	12·12	14·55
3′ 0″ × 1′ 0″ ,,	2·0000	2·91	5·82	8·73	11·66	14·56	17·45
4′ 0″ × 1′ 0″ ,,	2·6667	3·88	7·76	11·64	15·52	19·39	23·27
5′ 0″ × 1′ 0″ ,,	3·3333	4·85	9·70	14·54	19·39	24·24	29·09
1′ 6″ Barrel Drain	1·1781	1·71	3·42	5·13	6·84	8·55	10·26
2′ 0″ ,,	2·0944	3·05	6·10	9·15	12·20	15·25	18·30
2′ 6″ ,,	3·2720	4·76	9·52	14·28	19·04	23·80	28·56
3′ 0″ ,,	4·7124	6·85	13·70	20·55	27·40	34·25	41·10
4′ 0″ ,,	8·3776	12·19	24·38	36·57	48·76	60·95	73·14
5′ 0″ ,,	13·0900	19·04	38·08	57·12	76·16	95·20	114·24
6′ 0″ ,,	18·8496	27·42	54·84	82·26	109·68	137·10	164·52
7′ 0″ ,,	25·6564	37·32	74·64	111·96	149·28	186·60	223·92
8′ 0″ ,,	33·5104	48·74	97·48	146·22	194·96	243·70	292·44
9′ 0″ ,,	42·4116	61·69	123·38	185·07	246·76	308·45	370·14
10′ 0″ ,,	52·3600	76·16	152 32	228·48	304·64	380·80	456·96
1′ 6″ Concrete C.	1·506	2·19	4·38	6·57	8·76	10·95	13·14
2′ 0″ ,,	2·714	3·94	7·88	11·82	15·76	19·70	23·64
2′ 6″ ,,	4·136	6·02	12·03	18·05	24·06	30·08	36·10
3′ 0″ ,,	5·885	8·56	17·12	25·68	34·24	42·80	51·36
3′ 6″ ,,	7·877	11·46	22·92	34·37	45·83	57·29	68·75
4′ 0″ ,,	9·302	13·53	27 06	40·59	54·12	67·65	81·18
4′ 6″ ,,	11·773	17·13	34·25	51·38	68·50	85·63	102·75
5′ 0″ ,,	14·003	20·37	40·74	61·10	81·47	101·84	122·21
5′ 6″ ,,	16·943	24·63	49·28	73·91	98·55	123·20	147·83
6′ 0″ ,,	20·157	29·32	58·64	87·96	117·28	146·59	175·92
7′ 0″ ,,	26·903	39·13	78·26	117·39	156·52	195·65	234·78
8′ 0″ ,,	35·863	52·16	104·33	156·49	208·66	260·82	312·98
9′ 0″ ,,	45·421	66·06	132·13	198·20	264·26	330·33	396·40
10′ 0″ ,,	56·361	81·98	163·96	245·94	327·92	409·89	491·87

* In calculating for areas drained by pipes, the net discharge is reckoned at 1 inch less than the specified size.

PROCEEDINGS AND TRANSACTIONS

OF THE

Queensland Branch

OF THE

ROYAL GEOGRAPHICAL SOCIETY

OF

AUSTRALASIA.

7th SESSION,
1891-92.

EDITED UNDER THE AUTHORITY OF THE COUNCIL OF THE SOCIETY

BY

J. P. THOMSON, F.R.S.G.S., ETC., ETC.,

Hon. Secretary;

Honorary Corresponding Member of the Société de Géographie Commerciale de Paris, the Société de Géographie de Marseille, the Royal Scottish Geographical Society, the Manchester Geographical Society, and of the Sociedad Científica "Antonio Alzate," Mexico

The Authors of Papers are alone responsible for the opinions expressed therein.

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1892.

CONTENTS.

VOL. VII. PART 2.

Royal Geographical Society of Australasia,

QUEENSLAND BRANCH.

THIS Queensland Branch of the Society has been established for the past seven years. The Society was established with branches in New South Wales, Victoria, South Australia, and Queensland, with the view of promoting the interests of Geographical Science, of encouraging exploration in Australasia, and of furthering the study of Physical and Commercial Geography.

While these objects cannot fail to commend themselves to the scientific and commercial classes of the community, and to many persons engaged in extending pastoral and mining enterprise into distant parts of the Continent, of which comparatively little is known, the great educational advantages to be derived from the establishment of this Society will be no less apparent to all intelligent colonists.

Any lady or gentleman may become an Ordinary Member, subject to election.

Entrance Fee, £1 1s. **Subscription, £1 1s. per annum,** due on the 1st July in each year.

The entrance fee and first year's subscription are payable **after** election.

Life Membership, ten guineas.

Members' Privileges.

To receive the Society's Diploma.

The right to be present at, and to introduce two friends to, all meetings of the Society.

Membership of the Royal Scottish Geographical Society when in North Britain without payment of additional fee.

Entrée to the Evening Meetings, Library, etc., of the Sydney, Melbourne, and Adelaide Branches of the Society.

To have access to the Library and other public rooms of the Society.

To receive a copy of the Society's official publications as issued by the various Branches.

Candidates for admission as Members of the Society must be nominated by two Ordinary Members. Copies of the "Constitution and Rules" and Nomination Forms may be had on application to the Honorary Secretary, Brisbane, Queensland, to whom all communications to the Society should be addressed.

N.B.—All Donations presented to the Queensland Branch of the Society are acknowledged by letter and in the printed "Proceedings and Transactions."

SUGGESTION.

Every person desirous of bequeathing to the Society any money is requested to make use of the following

FORM OF BEQUEST.

I give and bequeath to the Honorary Treasurer, for the time being, of the Queensland Branch of the Royal Geographical Society of Australasia, *the sum of*

for

the benefit of the said Branch of the Royal Geographical Society of Australasia, to be expended as the Council of the said Society may deem expedient for the promotion of Geographical Science or the purpose of exploration in Australasia.

SPECIAL MEETING.

Seventh Session.

A special general meeting of the Royal Geographical Society of Australasia, Queensland Branch, was held in the Museum Library, Brisbane, on the evening of Friday, January 15, 1891, at 8 o'clock. J. N. Waugh, Esq., M.D., &c., a past president of the Society, occupied the chair.

Elections.—Ordinary members: The Hon. F. P. Winter, Chief Judicial Officer, British New Guinea; Captain T. M. Almond, F.R.A.S., Portmaster, Brisbane; Messrs. R. C. Beck, W. A. Wilson, J. Ahern, and A. J. Burton.

Captain J. L. Michael, late Commander of the London Missionary Society's schooner "Harrier," delivered an interesting lecture on British New Guinea. To illustrate his remarks the lecturer exhibited several remarkably fine curios, including shell money and shell ornaments. Numerous characteristic types of landscape scenery, village scenes, and natives were thrown on a large screen by the magic lantern. The leading features of these were graphically described by Captain Michael, to whom a hearty vote of thanks was accorded, on the motion of Mr. D. S. Thistlethwayte, seconded by Mr. D. Rannie.

FIFTH ORDINARY MEETING.

SEVENTH SESSION.

THE fifth ordinary monthly meeting of the seventh session of the Royal Geographical Society of Australasia, Queensland Branch, was held in the Museum Library, Brisbane, on the evening of Monday, April 4, 1892, at 8 o'clock. The President, Hon. A. C. GREGORY, C.M.G., M.L.C., F.R.G.S., occupied the chair. His Excellency General Sir H. W. Norman, G.C.B., G.C.M.G., &c, Governor of Queensland, who was accompanied by his *aide-de-camp*, Captain Strachey, occupied a seat at the right of the President. There was a large attendance of members and several visitors.

ELECTION.—Ordinary member: Mr. Wm. Soutter.

On the Hobart Meeting of the Australasian Association for the Advancement of Science.

By His Excellency General Sir H. W. NORMAN, G.C.B., G.C.M.G., C.S.I., F.R.G.S., *Delegate.*

HIS EXCELLENCY said: I have been asked to say some few words with respect to the recent meeting of the Australasian Association for the Advancement of Science, at Hobart, at which I had the pleasure of being present as one of the delegates of the Royal Society of Queensland, and, unfortunately, the sole delegate of the Queensland Branch of the Royal Geographical Society of Australasia. The meeting was a great success, and some very excellent papers were read at it. At the gatherings held in the large room of the Town Hall, when the address of the president for the occasion, the Governor of Tasmania, and when Professor Giffen's remarkable paper on "The Growth of the British Empire," were read, the room contained as many as it could hold. Of the papers read in the different sections, I

think that perhaps the greatest enthusiasm was excited over those in the literary section, which section, however, I am sorry to say, is to be excluded from future meetings as not being scientific. Much foresight was shown in the arrangements, and the Secretary, Mr. A. Morton, was indefatigable. The handbook which he prepared, and which was included in the donations acknowledged that evening, was very useful, and I think that even some people in Tasmania learned something from it. With respect to the geographical section, there was considerable disappointment felt that Sir William MacGregor, who had been invited to preside, was unable to attend. I was not aware that Sir William was invited. Had I been aware of it, I would have known without the slightest doubt that Sir William would have been obliged to refuse, as it was quite impossible for him, with his important and constant duties, and having to come to Brisbane for about six weeks every year to consult with the Government of Queensland, to add to that absence by going to Tasmania for a meeting which only lasted, after all, for a few days. I felt that it was a great deprivation that our respected President, who is himself a great explorer, was not able to be present, or our Honorary Secretary, who takes so much interest in geographical science. Had it been possible for our President to have attended, I assume that he would have been president of the geographical section. However, they were fortunate in having as president Captain Pasco, of the Royal Navy, who was peculiarly fitted for the position. Captain Pasco served in the "Beagle," assisted in founding the settlement at Port Essington so far back as the year 1838, was in the "Brittomarte," under Captain Owen Stanley, when that vessel was surveying the coasts of Australasia, and afterwards took part in surveys of the coast of China. As President he delivered a valuable address. I might, in passing, mention two circumstances connected with Captain Pasco's family. His son has been amongst us for the past two or three years in the gunboat Paluma, engaged in surveying the northern coast of Queensland; and his father, though the

circumstance has no geographical bearing, was signalling lieutenant on board Lord Nelson's ship, the "Victory," at Trafalgar, and was the person who hoisted the signal, "England expects every man to do his duty." Several interesting papers were read at the meetings of the section. I had the pleasure of reading a paper written by our Honorary Secretary on "Exploration in New Guinea." The room was crowded, and I believe the paper was received with great appreciation, and created in the minds of many people a lasting interest in what was the youngest possession of the British Empire, and a child of our own—New Guinea. One result of my going to Hobart was that the meeting after the next, which is to be held at Adelaide, will be, it is hoped, held in Brisbane. It is only right that the meeting should be held in Brisbane, as it is the only capital, except Perth, where it has not yet been held. I am quite sure that Brisbane will not be behind any of the other capitals in hospitality and zeal for science. I trust that many valuable papers will be read at the meeting, especially in the geographical branch. A great deal of information could, I am sure, be given as to our large colony and the adjacent seas that would be new to most of those not resident in Queensland, and to many who were resident here. (Applause.)

Mr. Gregory said he should only be voicing the unanimous feeling of the Society on the subject if he expressed their heartfelt thanks for the way in which his Excellency had represented the Society in Tasmania. It was really a matter of great interest to listen to the information which he had communicated. To himself (Mr. Gregory) who knew Captain Pasco so many years ago in Western Australia, it gave him great pleasure to hear that he held so important a position as president of the geographical section on the occasion referred to. He was sure it had been a fortunate thing for the Society that his Excellency had been able to represent them, and he had therefore to thank him for the kind manner in which he had executed the duties of Patron of the Society, in representing them in Tasmania. (Cheers.)

The author delivered the following lecture:—

A Brief Account of the Work and Aims of the Chief Weather Bureau, Brisbane.

By Clement L. Wragge, F.R.G.S., F.R.Met.Soc., &c., Government Meteorologist, late of Ben Nevis Observatory.

Mr. Wragge, who was received with cheers, said: Your Excellency, Mr. Chairman, ladies and gentlemen: You will recognize that it is impossible for me to do full justice to the subject I intend addressing you upon during the short space of time we have to be here this evening. I wish to make clear to such ladies of my audience, and those members of the Geographical Society who have not given special attention to meteorology, the way in which I am enabled to frame, with a result giving a very high percentage of accuracy, weather forecasts for all parts of Australia, and adjacent areas of ocean. You will all readily agree that no branch of science can be more interesting in its practical bearing on the community than meteorology; and you will also recognize that it is a most important branch of geography, for I think no geographer has yet succeeded in defining any boundary line between meteorology and physical geography. Meteorologists in their work keep two objects steadily in view: (*a*) to use the utmost endeavours to issue accurate forecasts of the weather in shipping, agricultural, pastoral, and general interests; and (*b*) to find out, and thoroughly examine, peculiarities of local climate—hence the science of climatology. The study of meteorology is but of little avail if it does not prove of thoroughly practical benefit to the community; and that it *is* rapidly becoming of eminently practical use, I hope to make clear to you. We desire to know alike the climate that prevails, for instance, on the plain, in the scrub, on the adjacent slope of the nearest hill, and on its highest summit. We want to find out exactly, especially in the sugar districts of Southern Queensland, those lines to which the ground frost reaches, and other elements vital to successful agriculture of a similar nature. It is also of the

very first importance to ascertain the hygienic conditions which prevail in such parts of selected country. Some constitutions would be much improved by residence in a dry atmosphere, and others might find that living in a moister climate would prove more beneficial. Therefore, as to accurate weather forecasting, and also as to climatology, the meteorologist distinctly aims at the satisfactory performance of a great national work. Now I will deal very briefly with the forecasting part of the business. Before we can do anything in this line we must have standard barometers scattered as far over Australasia as possible. *To understand and properly interpret the conditions of Queensland weather, it is absolutely imperative that we look farther afield than our own colony.* The true meteorologist can recognize no boundary or political dividing lines between countries or colonies. We in Queensland must not only know what is going on in Western Australia, the Northern Territory, South Australia, Victoria, New South Wales, Tasmania, New Zealand, and the Western Pacific, but we must get all the information we can from the Arafura Sea, the Isles of Sunda, Eastern India, China, Japan, and the Pacific generally; and it is of the utmost importance that we should get information from the Indian Ocean, and especially from high Southern latitudes. I do not think that any branch of science would be better served than meteorology, if the long-talked-of Antarctic expedition were to become *un fait accompli.* Hence my offer to your Society in Victoria, before I had the honour of joining the Queensland service, to accompany such an expedition. The barometric data would prove of the utmost importance to meteorological investigation. Ross succeeded in proving that a large zone of permanently low pressure exists in high Southern latitudes. Now this Antarctic depression influences largely the weather of the Southern colonies, and not only so, but the weather of South Queensland also.

I will now show you the barometer which is placed at our various stations. It is known as the "Board of Trade" or "Kew" barometer, and is equally available for land or sea service. At some places the "station" pattern of this instrument

is in use, having a somewhat wider bore than the one now exhibited. At others, again, the well-known "Fortin" is employed; but the before-named instrument, having an iron cistern, is rapidly superseding the "Fortin," the leather case of which is liable to deteriorate in tropical and semitropical climates. It is not possible for me to-night, even if it were necessary, to explain the mode of setting the Vernier scale and reading the barometer to thousandths of an inch. I merely wish to impress upon my hearers the vast importance of preserving the Torricellian vacuum by taking every possible means during transit or removal of a barometer to exclude air from the upper part of the tube. Even should it be necessary to carry a barometer from one room to another, or to remove it from one wall to an opposite wall, the instrument must be most carefully lifted from its position and immediately inclined very gradually and gently until the mercury very softly flows to the end of the tube and fills it. In this position it can be removed any distance, and must invariably remain *cistern end uppermost always when travelling;* avoiding knocks, jars, or concussions of any kind. To rehang the instrument, bring it to the erect position again very gently and gradually, and place it on the hook or within its bracket, which is first to be screwed to the wall, so that the cistern is about 2 feet 6 inches above the floor. If these instructions are not carried out to the letter, air or moisture might reach the main tube. Such would cause the mercurial column to read lower than it ought; and hence false values would be recorded, which might in a large weather service seriously interfere with the work of the meteorologist when plotting on his chart the isobars or lines of equal barometric pressure. An incorrect barometric reading, if not discovered, might cause him to produce a loop in his isobar which had no real existence; and if he based a forecast on erroneous contouring of isobars it would probably fail. Now, I have said that in order to do anything in the way of issuing forecasts we must have a series of barometers scattered as far over Australia as possible. In Queensland they are placed about 100 miles

apart; and, as I have carried most of these instruments myself to our far western stations, you will understand from what has been said what an awkward baby a barometer is when travelling. A complete list of all meteorological stations in Queensland, and also of intercolonial and Pacific stations in connection, will be found in the "Queensland Postal Guide." Now let us see what a series of barometric data, properly corrected and reduced —as will be explained later on—teach us. Remembering that the barometer measures the pressure of the atmosphere much as one would weigh a pound of sugar or a pound of tea, by its means we can find where are the anticyclones or the mountains of atmosphere, and where the cyclones or valleys in the air. However, before we can make such discovery, it is imperative that all the barometric readings over any given country be reduced: (*a*) to the standard or uniform temperature of 32 deg. F., and (*b*) to a standard or uniform level—that of mean sea level.

Now as to reduction (*a*): Note the thermometer attached to the barometer, technically known as the "attached thermometer." This instrument is for ascertaining the temperature of the barometer itself, of the main mercurial column, of the framework, and its brass scale. Most bodies expand by heat and contract by cold. It is therefore very obvious that if we have two barometers, one hanging in this room and another instrument of the same pattern and hung at the same height in an adjacent room heated by fire, the latter would read higher than the first by reason of the higher temperature, and therefore it would be necessary to reduce these observations to a standard temperature before we could compare their readings. We can only perform this reduction by noting the reading of the attached thermometer, and then subtracting from the reading of the barometer a value sufficient to reduce the reading to what it would be if the "attached" read 32 deg. Fahrenheit. (These corrective subtractive values are taken from the well-known tables for reducing barometers having brass scales to 32 deg. F.) And again: before we can draw such isobars as will enable us

to discover where anticyclones and cyclones exist we must consider correction (*b*) for reduction to mean sea level. In order to do this we must ascertain the height of the cistern of the barometer above the mean sea level. Now, why is this essential? Simply by reason of the decrease of pressure with altitude. Everyone knows that the higher one goes the more is the atmosphere that is left behind, and hence the greater the fall of the mercurial column in the barometer by reason of the so-called force of gravity, amounting to about 0·095 for every 100 feet; conversely, the lower one descends the greater the depth of atmosphere attained, and consequently the higher the barometer. Therefore it is very plain that the readings must be reduced not only to 32 deg. F. by a subtractive correction, but also to mean sea level by an additive correction. It will be noticed by referring to the "Postal Guide" that many of our stations are situated on the railway lines. Why so? Not only on account of geographical position, but because the levels or altitudes above sea of the railway metals are known. It is therefore an easy matter to level thence to the cistern of the barometer, and thus obtain its correct altitude. Hence the railways may be regarded as base lines in the problem of barometric reduction. Of course at our coast stations it is easy to level from "the half-tide datum" direct to the cistern of the barometer and at once ascertain its height. But in the case of far inland stations such as Tambo, far from railways, it is a rather difficult matter. To obtain the correct elevation of a barometer at such a place, we have to consider that Tambo and Charleville or Tambo and Alice River (another of our stations, on the Central Railway) are directly or vertically over each other—presuming that any difference of level exists. But such assumption is not tenable for working purposes unless the general isobaric lines show that no great difference of pressure exists horizontally between the places named. When conditions are satisfactory, the difference in level between Tambo and the ascertained levels on either side is determined barometrically taking a mean of many results, repeating the operations, and

thence deducing a grand mean which cannot differ from the truth more than 5 feet, which is virtually inappreciable for the sea level reduction. The method here described applies to Avon Downs, Thargomindah, and other of our stations similarly situated. Having now obtained all the barometric data by telegraph, and the same having been properly corrected and reduced, we proceed to plot the figures on a blank map of Australasia, and thereafter to lay down lines through those places or regions having equal pressures. Hence the isobars, and hence by their delineations the discovery of such anticyclonic or cyclonic systems as may exist. I have already told you that an anticyclone is virtually a mountain of atmosphere. Let us now examine this type of disturbance more in detail. It is always more or less circular in shape, though the nucleus, centre or summit may at times be very irregular in outline or assume the shape of a long ellipse.

It will now be understood that the barometric values are highest in the centre of an anti-cyclone, and that the isobars decrease in value thence on all sides. To give a practical explanation :—During winter the interior of Australia, cooled by nocturnal radiation, becomes a favourable region for the formation of, or development of energy in an anti-cyclonic system; and the nucleus of such, frequently situated a little south from Alice Springs, is usually embraced by the isobar of 30·5. As we recede from the centre, the isobars decrease in value through 30·4, 30·3, and so on, until the line of 30·0, forming the boundary of the system, usually follows in contour the entire coastline of Australia, or immediately adjacent waters. Let us now remember Buys Ballot's famous law of wind circulation for the southern hemisphere :—"Stand with your back to the wind, and the barometer is lower on the right hand than on the left"; and remember at the same time the fact that round high pressure systems in this hemisphere the wind circulates in the *opposite* direction to the hands of a watch. Now let us cut the entire anti-cyclonic system into quadrants. It is very evident that on the N.E. side the wind will be S.E., on the

northern edge E., on the N.W. side N.E., on the western edge N., on the S.W. side N.W., on the southern edge W., on the S.E. side S.W., and on the eastern edge S. Now here we have at once a valuable key to weather forecasting. Bearing in mind that change of wind means change of weather, and that geographical position influences the character of the weather under any given wind, we can (as we see an anti-cyclonic area gradually overlapping Australia from the Indian Ocean, and increasing in energy as the nucleus approaches the centre of the continent) forecast very nearly the line of its course still further eastward, and predict the weather that the winds will bring on each side of the high pressure system, as they traverse wholly or in part continental or oceanic areas respectively. In a word, the N.E. wind on the N.W. edge of the system, as it passes the centre of the continent, means a very different type of conditions to that produced by the same wind when that edge of the anti-cyclone is passing over the Pacific sea-board. And so with the other winds circulating round the anti-cyclone—one must consider (*a*) the side or edge of the system which has to be dealt with, (*b*) the geographical position of that side. It is now very evident to thoughtful listeners that the words "stormy," "rain," "change," "fair," "set fair," which often appear on barometers, have intrinsically no meaning whatever; everything in relation to barometric interpretation depends upon the latitude and longitude of the observer, and the height of his instrument above the sea. To make this clear, I will only instance one fact. A falling barometer in Brisbane in our so-called winter indicates the approach of some of our finest weather, with those clear, deep-blue skies for which these southern lands are so famous; a falling barometer in Adelaide means the approach of heavy weather off the coast from the Southern Ocean, with rain and heavy masses of cloud. If, now, we consider the low pressure or cyclonic type of atmospheric disturbance, the principle of the isobaric plotting of and forecasting by the same is similar to that just described, considering that the state of matters is reversed. A cyclonic area, in the

language of the meteorologist, does not necessarily imply a tropical hurricane or tornado. It is simply the opposite of an anti-cyclone—that is to say, a cyclonic system may be likened to a valley, gully, or hollow in the atmosphere. Such also is frequently more or less circular in shape, and the barometer at the centre or nucleus of the "valley" reads *lower* than on all sides thereof. Isobars from 29·2 to 29·6 in this part of the world frequently embrace the internal cone or hollow of such a disturbance, and as we recede from the centre the values *increase* to 30·0, which value is, as we can now see, very often the boundary isobar between a high and a low pressure type of disturbance. And again—the circulation of the wind around cyclonic systems is opposite to that around anti-cyclones in the southern hemisphere—the circulation is *with* watch hands. Hence, dividing such a system into quadrants, as we did the anti-cyclone, we have on the N.E. side a N.W. wind, on the E. edge a N. wind, on the S.E. side the current is N.E., on the S. edge E., on the S.W. side S.E., on the W. edge S., on the N.W. side S.W., and on the N. edge W. And as with the anti-cyclone, so with the cyclone—the winds and the character of the weather each will bring, in accordance with the motion of the system and changing geographical positions, can be predicted with the most careful judgment and consideration; and there is no occasion to reiterate further on this subject, for the same key turned the opposite way, if I may be allowed the expression, unlocks the problem. Therefore comfortably seated in the office—instead of peering into the sky with a big telescope from the Observatory tower, as some people suppose—can I, with thoroughly reliable and corrected and reduced data laid down on a blank map of Australasia, foretell the weather conditions that each, and every side of each type of disturbance will bring; and as the isobars which such data enable me to plot are closer or farther apart, so is the barometric gradient, and hence can I forecast whether or not the winds will be strong in force or otherwise—giving rough seas or calm ripples to the intending voyager. Other types of atmospheric disturbance are (*a*) extensions in the form of V's from the

great Antarctic zone of low barometers, and (*b*) monsoonal "tongues" or "valleys" stretching southward from the equatorial low pressure region. The former usually lies S.E. or S.W. from an anticyclonic mountain, from which the air flows from the upper regions of the atmosphere, rushing into the depths of the low pressures, hence tending to maintain the uprush of air which observation shows occurs over areas of low barometers. And here let me remark, that as the high pressure feeds or maintains the circulation of the low pressure system, so does the uprush of air in the low pressure—overflowing, as it were, in the upper regions of the atmosphere—tend to accumulate, and becoming chilled sink down upon the high pressure nucleus, and thus help in its turn to maintain it.

Now (bearing in mind that one can only arrive at such conclusions and issue forecasts by means of the receipt of barometric data from a wide area of country, corrected and reduced to 32 deg. F. and mean sea level, from which can be plotted the isobars and hence the high and low pressure systems with their respective wind circulations discovered) let me lay a few typical cases before you as mere instances of what I am enabled to do in the way of practical weather forecasting.

(*a*) An antarctic V-shaped disturbance shewing up off Cape Leeuwin in summer means hot winds from N.E. and N., veering W. and thence to S.W., with "southerly busters" following, preceded by dust storms, such conditions affecting the coast parts of all the Southern colonies, except in a measure the coast of New South Wales.

(*b*) A large anticyclone covering Australia in winter means fair weather over the greater portion of the continent, except for coastal rains under S.E. winds in Queensland, and rain squalls and westerly winds along the southern littoral.

(*c*) Two anticyclones—the advancing side of the one lying over Western Australia, and the receding side of the other over Eastern Australia, with tongues or extensions from the antarctic and equatorial low pressures wedging in or meeting between them—imply thunderstorms and a transcontinental rainfall.

(*d*) An anticyclonic nucleus covering Central Australia, with the top of a V-disturbance midway between Australia and New Zealand, means in winter very fine bracing weather in S.E. Queensland and westerly winds.

(*e*) A low pressure system N.E. from Sandy Cape, with a long elliptical coll or sierra of high pressure stretching from New South Wales to New Zealand, means in the early months of the year heavy flood-rains and cyclonic winds in the neighbourhood of Brisbane.

These are just a few instances of my discoveries, and judgment has to become an all-powerful factor in interpreting the details which enable the work of the Office to be carried on in its present efficiency. From what has been said it is obvious that, aided as I am by the telegraphic data, I can issue forecasts for all the Australasian colonies, and adjacent seas, with as much success as for Queensland alone; and it is only by concentration of effort and the aggregation of data at one central point, as at Brisbane—following the precedent of the Chief Signal Office, Washington—that the meteorology of Australia and intercolonial weather forecasts can be adequately interpreted and satisfactorily issued. I beg to thank you for your kind attention, and regret that the time at disposal absolutely prevents me from entering more fully into the subject.

On the motion of Major A. J. Boyd, seconded by the Vice-President, Mr. R. Gailey, and supported by his Excellency the Governor, the hearty thanks of the Society was conveyed to Mr. Wragge for his interesting lecture.

To illustrate his discourse, the lecturer exhibited an elaborate set of the weather charts of Australasia, and several instruments of the type used at meteorological stations. He also drew diagrams of cyclones and anticyclones on the blackboard.

SIXTH ORDINARY MEETING.

SEVENTH SESSION.

THE sixth ordinary monthly meeting of the seventh session of the Royal Geographical Society of Australasia, Queensland Branch, was held in the Museum Library, Brisbane, on the evening of Monday, May 30, 1892, at 8 o'clock. The President. Hon. A. C. GREGORY, C.M.G., M.L.C., F.R.G.S., occupied the chair.

ELECTIONS.—Ordinary members: Messrs. Robert Bruce, J.P., and Howard Haywood.

Weather Forecasting.

The PRESIDENT stated that limited time at the previous meeting had prevented a discussion upon the important subject of Mr. Wragge's lecture on "Weather Forecasting in Australasia." When it was unanimously decided by the Council to set apart this meeting for discussion, arrangements were made to have the lecture printed, so that members would have the advantage of being supplied with slips: these were now ready, and, being placed upon the table, every facility was provided for going into the matter thoroughly. He thought it would be better for some-one of the members to open the discussion; they might desire, for instance, to ask questions on points not quite clear to them at the previous meeting concerning the movements of cyclones and their development. Mr. Wragge would then have the opportunity of replying. By that means much valuable information might be obtained supplemental to his former discourse.

Mr. J. P. THOMSON, Hon. Secretary, opened the discussion by drawing on the blackboard a diagram illustrative of a typical cyclone. Mr. Wragge had only shown them one of the movements of a cyclone—namely, the direction of the circulating atmosphere; but it should be borne in mind that cyclones have two distinct movements, that of revolution and rotation. From

his own observations he believed that in the Southern hemisphere cyclones always travel from north-east to south-west. In the Northern hemisphere the movement was in the opposite direction. The weather changes connected with cyclones, he considered, arise from the agitation of the atmosphere, caused by an ascending column of surface air. The air rises in the centre and flows out above; it is then cooled by expansion, and the vapour condensing into cloud falls on the surface of the earth in the form of rain. Rise of barometer indicates that the centre of the disturbance has passed when the strongest winds are experienced, by reason of the fact that in typical cyclones, such as that represented on the blackboard, the gradients are always steeper in the rear than in the front. The hurricanes usually experienced in the Western Pacific were, he said, unlike cyclones of the temperate zones, inasmuch as, in his opinion, they originated from local heating of the air. They were probably small cyclones having slow motions and very steep gradients, being usually accompanied by very severe winds and heavy precipitations. To more fully illustrate his remarks, Mr. Thomson read several extracts from official reports of observations he had made on the circulation of the atmosphere during the progress of hurricanes in the Western Pacific. Referring to weather predictions, he thought that in order to issue weather forecasts extending over a longer period than twenty-four hours, meteorologists would have to study the cause of the origin of storms, as well as the more apparent phenomenon of effect.

In reply, Mr. Wragge admitted that Mr. Thomson was right in his views regarding the motion of a cyclone; but the illustration on the blackboard did not exactly represent a southern cyclone. If the diagram were reversed the position would be more closely represented. Mr. Wragge then turned the blackboard upside down, thus showing the typical cyclone with gradients steeper in the front than in the rear. He stated that cyclones are always associated with anticyclones, the one requiring to be fed by the other. Anticyclones were usually developed near the centre of continental areas during winter, when interior

regions are cooled by nightly radiation; and it sometimes happened that cyclonic disturbances approaching the Australian continent from the Indian Ocean were met by extensions in the form of V's from the great antarctic zone. These phases of atmospheric circulation were diagrammatically illustrated on the blackboard. Referring to weather forecasting, Mr. Wragge said that although not perhaps an exact science, meteorology was very nearly so. In a very short space of time he hoped to be in a position to place some very important information before the society regarding the causes by which disturbances are developed. In answer to a question by the Hon. Secretary, Mr. Wragge admitted that there could be no doubt that cyclones and hurricanes were probably largely associated with solar energy. On the conclusion of his remarks, Mr. Wragge proceeded to explain a chart showing the isobars of a great ocean forecast he had made at the Chief Weather Bureau. He afterwards exhibited a complete set of meteorological instruments with which first order stations are equipped. These included barographs, thermographs, self-registering clockwork thermometers and hygrometers, the "Kew" barometer, and a rain gauge. The internal parts of these were lucidly explained by Mr. Wragge and the Hon. A. C. Gregory.

Before the proceedings terminated, the PRESIDENT conveyed the cordial thanks of the Society to Mr. Wragge.

SEVENTH ORDINARY MEETING.

SEVENTH SESSION.

THE seventh ordinary monthly meeting of the seventh session of the Royal Geographical Society of Australasia, Queensland Branch, was held in the Museum Library, Brisbane, on the evening of Friday, June 17, 1892, at 8 o'clock. The PRESIDENT, Hon. A. C. GREGORY, C.M.G., M.L.C., F.R.G.S., occupied the chair. His Excellency General Sir H. W. Norman, G.C.B., G.C.M.G., &c., Governor of Queensland, who was accompanied by his private secretary, Hon. R. G. V. Wallop, occupied a seat at the right of the President. There was a large attendance of members and several visitors.

ELECTIONS.—Hon. Corresponding Member: Mr. H. C. Russell, C.M.G., B.A., F.R.S., F.R.A.S., Government Astronomer, Sydney. Ordinary Member: Mr. A. Gibb Maitland, F.G.S.

The PRESIDENT presented to the Society copies of E. P. Whymper's "Travels amongst the Great Andes of the Equator," G. Neumayer's "Results of the Magnetic Survey in the Colony of Victoria between 1858 and 1864." On the motion of Major A. J. BOYD, Mr. Gregory was cordially thanked for his valuable donation to the Society's Library.

The author read the following paper:—

Practical Suggestions to Travellers.*

BY J. P. THOMSON, F.R.S.G.S., ETC., *Hon. Sec. to the Society (Formerly Government Surveyor, Fiji).*

Experience has convinced the writer that, in many instances, the geographic results of what may very properly be termed costly undertakings, are not, either commercially or scientifically, commensurate with the amount of capital and labour bestowed upon them. It is to the strength of this conviction that this theme owes its suggestion, and it is upon the results of prolonged professional experience that the following observations are based. While the existence of incongruity of results is shown by the

**Read at a meeting of the Manchester Geographical Society, in December, 1891; now revised and added to.*

conflicting current issues of explorations, it is chiefly by a review of the history of cartography that a proper value can be assigned to each series of observations. A retrospect view of this history points to an almost bewildering mass of confused and irreconcilable data, collated by voyagers and explorers from almost every available part of the world. These incoherencies, which not infrequently engender painful and bitter controversies between individuals and parties, sometimes resulting in tedious and expensive litigation, exist chiefly in connection with positions as defined by the terms latitude, longitude, and height. Explorers should bear in mind that maps showing incorrect delineations of natural features are as dangerous to the landsman as bad chronometers are to the mariner; upon the face of both lies are imprinted which are misleading and abominable. Expeditiousness in the field of exploration is the preponderating feature of the age in which we live, hence it is not infrequently brought about that the far more important matter of establishing a reliable basis upon which operations are to be conducted and completed is altogether subordinated to the former; nor does the evil here end, for hurried marches and voyages deprive other dependent branches of science of valuable aid, by leaving in obscurity that which, by human intelligence, should be brought to light, while the country operated upon itself suffers greatly by reports which subsequent experience is unable to verify; so that, thereby, without doubt, progressive science and civilisation are retarded. It is a notorious fact that discrepancies of astonishing magnitude, which would not be tolerated in even the most lax professional practise, occur in results obtained by different observers from identical localities. Mountains are made to project from plains, where, in reality, none exist; rivers emanate from mythical sources, and meander through regions where both man and beast would die of thirst; while lakes claim sites occupied by nothing save the rugged slopes of mountains and the barren wastes of sand; and all this occurs in our enlightened age of science, literature, and art—this decade of geographic culture.

Differences, of no practical importance however, will necessarily occur for all time, such as those arising from inequality of instrumental values, changeableness of atmospheric conditions, and the influence of physical peculiarities, common to the human organisation as exhibited in different observers; but, outside a reasonable limit assigned to these causes, no greater scope of probable error should be admissible under any conditions whatever.

None but approved instruments should be used for observations, the results of which should be computed by standard mathematical formulæ only.

Stellar or solar observations should be carefully conducted along the line of march, preferably at places possessing natural prominence, and imperatively at the mouths, sources, and union of water-courses, likewise on mountain tops, and along the culminating parts of water-sheds. These observations should be properly recorded on approved forms, and conducted with sufficient precision and care to guarantee determination of actual positions plus or minus probable errors not exceeding standard limits aforesaid. These positions should be defined, by special marks, as fixed stations; the compass declination should also be determined, and the several position data elucidated, so that, if necessary, they could at any future time be verified.

For the practical realisation of this object, which would not fail in educational influence, by elevating the study of Geography, uniformity of operations and a higher standard of practical proficiency should be insisted upon; mere theoretical knowledge, unsupported by practical experience, should not be admissible, and, while adequate recognition for more than an ordinary display of energy and great physical endurance should not be withheld, the greatest distinctive attributes should only be bestowed for the most valuable results from a professional standpoint. It is the man through whose special professional qualifications geographical science, in the abstract sense, has been most largely enriched, that the brotherhood should love to honour; not the traveller whose sole aim is clearly manifested by a consuming desire to climb the highest point, or to cover the

greatest distance within a given space of time, in either of which success may be the reward of fortitude, but neither of which may necessarily confer lasting benefits upon the race, nor materially increase our knowledge of the actual geography of the region so operated upon.

Viewed as purely introductory, these foregoing remarks may now be followed by a few simple and practical suggestions, which the writer has selected and endeavoured to present to the reader in as brief a manner as possible. These, if carefully acted upon, will probably not fail in producing satisfactory results to specially organised expeditions for the exploration of isolated parts, and to the ordinary traveller who may desire to be useful.

Where purely mathematical subjects are dealt with, it may be advantageous, especially to the inexperienced, to use the simplest methods, and thus avoid complicated formulæ, which, for ordinary purposes, are unnecessary.

As the felicitous issues of an expedition in a very large degree depend upon the leader, too great care in the selection of that officer cannot be enjoined. Physical fitness should be certified by actual medical test, and the professional standard by practical demonstrations and certificates of competency of indisputable value. Firmness, coolness, tenacity of purpose, and boldness, should be special characteristic investitures; while essentially a thorough disciplinarian, he should also be a recognised humanitarian, a powerful organiser, and a man of unlimited resource; his moral qualities, especially, should be unimpeachable and exemplary, so that his presence, even in the midst of the most enticing surroundings, may silence emotion and engender respect and confidence. These are the fundamental characteristics of life's greatest successes, and in the field of exploration especially, where uncontrolled actions and free intercourse with uncivilized communities are inevitable, their presence is paramount. In manning expeditions for inland explorations the European element should be limited to a minimum, as experience has convinced the writer that the best results are obtainable by a staff of coloured workers, because—

(*a*) When properly trained, they are, with few exceptions, willing and thoroughly susceptible to discipline.

(*b*) They are easily fed, and can adapt themselves to circumstances with astonishing ease.

(*c*) They perform their duties cheerfully, even under the most unfavourable conditions, and do not agitate nor conspire to supersede.

(*d*) Amongst other reasons, they rarely cause after trouble, nor do they pretend to know or to have done more than their leader. [These remarks, be it understood, apply particularly to Polynesians, some of whom, for several years, constituted the writer's field-staff.]

We shall now proceed to deal with that part of our subject embracing instrumental equipment.

In selecting instruments for use in the field of exploration, especial care should be exercised in testing both their quality and accuracy, while suitableness for the special purposes for which they are intended should also receive due consideration. To this end the *leader's especial* attention should be given before setting out upon a journey, so that index errors and other defects, inseparable from even the best class of instruments, may be recorded, while the most favourable conditions are available. This is so essential to success, that it is difficult to over-estimate its value.

As to the most suitable class of instruments, it is well to bear in mind that portableness combined with utility is the great desideratum; and nothing should induce the explorer to enter the field with ponderous and clumsy instrumental equipage, suited more to the surveyor than the rapid traveller.

A Pocket Compass should be provided: this must be furnished with a needle having a pivot revolving between a pair of agates, so that vertical vibration may be minimised: one end of the needle should be provided with an adjusting weight to compensate for its dip in localities where affected by local attraction. The use of this compass is to indicate the direction travelled, and may be said to be the fundamental basis of the "Dead Reckoning." This instrument requires to be supplemented by a

Prismatic Compass of about three inches in diameter, having a flat needle of equal size from end to end, with a circle of very light aluminum divided into degrees from zero to 360, so that magnetical azimuths may be recorded as 290°, instead of the old school system of N. 70° W. Instead of an ordinary card, the lower surface of the aluminum should be covered with a thin disc of mica; this has the advantage of minimising excessive vibrations, both vertically and horizontally, caused by friction with the air resistance in the box, an obstacle that often perplexes and which not infrequently causes errors in rapid observations made by the ordinary card. Mica also possesses the very desirable advantage of not being influenced by moisture. The general use of this compass is for the determination of bearings of distant objects, especially remarkable hills, mountains, and other natural features, also for observing the sun's magnetic amplitudes at the time of its rising or setting, to determine the declination of the needle. This instrument should be provided with a handy stand of about four feet in length, composed of a piece of very light rounded wood of about one and a half inches in diameter, having a flat head formed of a small thin board about three inches square, and fastened in position by means of a wooden peg; the opposite end of this stand should be pointed. This simple arrangement, when stuck temporarily in the ground, will enable an observer to determine the bearings of objects with greater facility and accuracy than by the questionable and unsteady method of simply holding the compass by hand. When the summit of a mountain or a hill is the point of observation, the compass should only be used for observing the magnetic bearing of one distant and well-defined object, the angles subtended by that and other features being determined by the box-sextant; this assures greater rapidity and obviates liability of errors from local magnetic complications, which, on isolated hills of igneous or granitic rock, are often considerable.

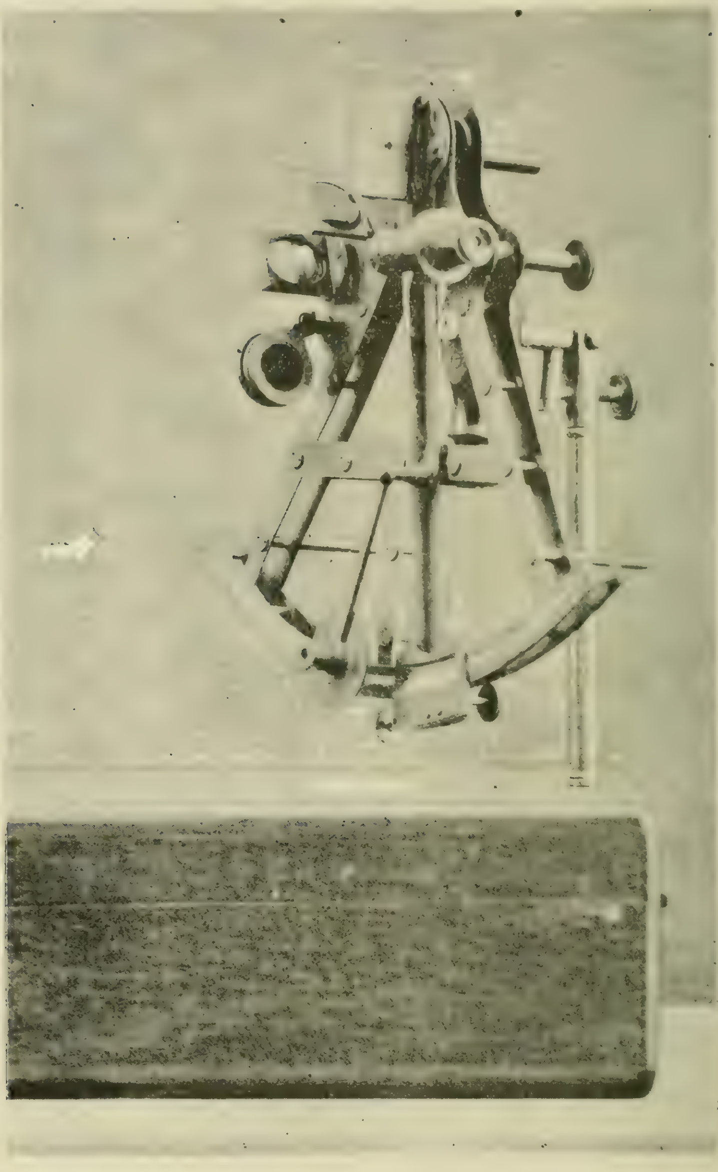
The Box-Sextant.—This instrument is indispensable to the explorer, not only by reason of its convenient size, which for transportation entitles it to rank far before the nautical

sextant, but also for the compactness of its structure, which renders it less liable to injury than the other more pretentious form. The box-sextant may, however, in the hands of some observers, appear not altogether free from the disadvantage of the necessity of requiring considerable practice in its manipulation, especially when more than ordinary accuracy is desirable, such, for instance, as when the meridian altitudes of stars require to be observed for latitude. Practice will overcome that impediment, and enable double angles to be measured, by the aid of the artificial horizon, to 01′ or half-a-mile of latitude; so that practically, the limit of position error will be found to be within a mile. Instrumental errors are liable to effect observations of angles exceeding 110°; in measuring arcs of less than that number of degrees, probable errors may readily be detected and eliminated by observing one or more northern and southern stars. At the time of observation, instrumental index error should always be determined and proper entry made thereof; indicating the same by a + or — sign, so that the same may be applied to all apparent results. Frequent instrumental adjustments should not be resorted to, it being far preferable to apply a known index error to all observations than to have recourse to unnecessary and habitual displacement of the more delicate parts of an instrument. When observing star-altitudes with the box-sextant, the telescope should be withdrawn while bringing the image of the star down to, and making preliminary contact with, the artificial horizon, after which it should be carefully inserted and the contact completed It will, however, be found advantageous to avoid the use of the telescope altogether when observations of horizontal angles are being conducted; such, for instance, as in the determination of bearings of hills and other natural features, where a more extensive field may be obtained by observing through the larger aperture The box-sextant, notwithstanding its especial applicability to general purposes, should not be relied on, nor in fact used at all in the determination of longitude by lunar distances, the graduation of the limb being of such an unsuitable character as to render results of no

practical value. For the determination of the breadth of rivers, the box-sextant will be found most serviceable: it may also be used with advantage in measuring the lengths of river-reaches, each not exceeding a quarter of a mile, by observing the angle subtended by a ten-feet staff. This staff should, theoretically, be held in a horizontal position at right angles to the line of observation; because, when in the vertical position, the refraction at its bottom is much greater than at the top, causing an error in its observed angular length, and this, when the bottom of the staff rests on the ground, is often considerable. This difficulty may, however, be obviated simply enough by the use of a thirteen-feet staff, having white marks at three feet from the bottom and at the top; the refraction at three feet from the surface of the ground being practically equal to that at thirteen feet. The vertical staff will be found in practice the most reliable, because it can be more easily held in an upright position by an assistant, than precisely at right angles to the observer when horizontal.

THE SEXTANT.—For angular measurement, the capacity of this instrument is greater than that of the former, but the adjusting factors require careful manipulation, notwithstanding its simplicity. Although it cannot wisely be considered a substitute for the box-sextant, it should nevertheless claim a place in the equipment of a large party. In observing meridian altitudes with this sextant, where the use of an artificial horizon is necessary, the unaided hand of the observer will experience some difficulty in maintaining that steadiness so essential to accuracy. At sea, where the natural horizon is always available, this obstacle is less apparent; but to the land explorer, whose horizon is restricted within the narrow limits of a trough of mercury, the reverse is the case.

In conducting his famous observations, when directing and carrying out the important surveys connected with the determination of the southern boundary of Queensland, our distinguished President, Hon. A. C. Gregory, overcame this difficulty by inventing a remarkably simple stand, which is shown by the following illustration.



This stand is constructed by the insertion of a movable iron rod through the cover of the sextant box; through the top of this rod passes a mill-headed screw for regulating the movable arm that passes through the centre of the sextant handle. To the extreme end of this arm is attached a mill-headed screw to keep the handle in position. This arm constitutes the centre of vertical motion of the sextant, the azimuthal motion being centred in the upright rod, which is left free to revolve in the socket formed by the sextant box. When not in use, the stand is detached and fixed to a secure bed within the sextant box, its place in the lid being occupied by a wooden plug.

For special use, the writer prefers the PRISMATIC SEXTANT of PISTOR & MARTINS. Whereas the ordinary sextant is restricted to about 60° of arc, this measures angles from zero to 180°; thus enabling it to observe double altitudes of objects in or near the zenith.

GEORGE'S DOUBLE BOX-SEXTANT.—For all round purposes, this is both a serviceable and capable instrument, and one that the writer would strongly recommend to the explorer. It is specially designed for land transportation; being small and compact, it combines the very desirable quality of lightness with durability, and possesses the complete parts of two separate sextants, each adapted for separate use. For angular measurements, its capacity is nearly double that of the ordinary sextant, and it is capable of measuring two angles simultaneously. In localities where the use of an artificial horizon is essential, its value in observing celestial objects of great altitudes will be fully appreciated.

As an auxiliary to the sextant, an ARTIFICIAL HORIZON is necessary; of this there are several varieties, each one of which advances certain claims to excellence of worth. The solid block glass mirror, with levelling screws and spirit level, has its advocates and admirers; but, while its usefulness for sea-coast work, where much wind is often met with, is freely admitted, it cannot be so safely relied on as a fluid reflector. The simple trough of mercury, with glass cover, is undoubtedly the best known form; but

even with the greatest care the mercury is liable to loss, and, for this reason, it is a question worth considering as to whether a pannikinful of cold tea is not, after all, the most convenient and desirable form of reflector to use when well-sheltered from wind and inaccessible to mosquitoes.

For special purposes, such as the conduct of extensive detail surveys, the transit theodolite is indispensable, but for the ordinary exploration of extensive tracts of country, where, even at best, the results can only be regarded literally as approximate, it is far too cumbersome; when available, it will, however, be found very useful in the determination of the heights of mountains, trigonometrically, and of hills in localities where the sea horizon is visible. The approximate altitude of a hill may be determined by observing the angle of depression of the visible sea horizon in minutes, which, being corrected for refraction and squared, will be about equal to the height of the hill in feet above the sea level. The heights of trees or of remarkable objects of moderate elevation, such as isolated rocks, or monuments or temples, may readily be obtained without the aid of an instrument, by the simple method of a "fork-angle," in the following manner:—Let the observer move from the object to a point where he is enabled to see its top exactly, by bending forward and looking upwards through his fork. The distance from this point to its base will be equal to the height of the object. To obtain satisfactory results, it must be borne in mind that the surface over which this measurement is effected must necessarily be level. For the measurement of base lines and short distances, the steel band is decidedly the most convenient; this is now made in lengths of from 66 feet to 660 feet; the writer, however, found the 330 feet length the handiest for most purposes. Its great utility is clearly observed in the measurement of moderately undulating surfaces, unobstructed by jungle or forest, where deep gullies, separating ridges, may be spanned, or in measuring extensive plains and fore-shores. Care requires to be exercised in avoiding acute curves and twists in the band when in use, and in winding and unwinding; it should also be kept free

from rust; to this end especial vigilance is necessary when within the influence of the sea, or in localities where salt water is present.

Aneroids.—As in many cases the determined altitudes of elevated features depend chiefly upon barometric measurements, it seems that reference should be made to the instruments suitable for this purpose. Except in special cases where circumstances render the transportation of mercurial barometers safe and easy, aneroids are of the greatest practical value to the explorer, for the measurement of heights; of these the larger sizes are not generally convenient, owing to liability to derangement through sudden jerks; it will, therefore, be safer to carry two small aneroids of nearly equal size and similar make. The readings of both of these should be recorded when at rest, so that any apparent sudden divergence will indicate the probable derangement of one of them, the particular one being easily detected when any position of known elevation is reached. The influence exercised upon aneroids by the variations of temperature, renders the application of some test necessary, and for this purpose no readier and convenient means will be found to offer itself than that afforded by the exposing of the instruments alternately in the sun and in the shade, care being observed that, while in these positions, the differences of temperatures and of readings are minutely recorded, so that the necessary corrections resulting therefrom may be applied to all subsequent observations. Frequent manipulation of the adjusting screw in the field should be avoided; indeed, unless by the most skilful hands, no alteration of that governor should be attempted during the progress of a journey; it were better, and decidedly safer, to use a known index error, even though great, than to attempt an adjustment, for a gradual change invariably follows, and continues for several days, a movement of the adjusting screw.

In the writer's opinion, hypsometric measurements are not reliable for the accurate determination of heights, the equivalent of 510 feet to 1° Fahrenheit, being too great in range to satisfy the requirements of accuracy; and this will become all the more obvious when emphasised by the fact that the boiling point of

water varies considerably with the shape of the vessel used to boil it in; for this reason alone, hypsometric values can only be regarded as mere approximations.

Notwithstanding its popularity, theoretically, with some travellers, the writer's experience convinces him that, while readily acknowledging its simplicity and convenience for the purpose of the sketching-in of minor details between well-established points, the Plane Table is not only deficient in accuracy, even when in professional hands, but very grave mistakes are liable to be made when attempting the orientation of the table at isolated stations where no connecting checks with other established points are available. In thickly timbered country, unless extensive clearings are made, it is practically useless, and its inability to record the number of degrees of measured angles frequently leads to confusion in attempting to rectify accumulated errors arising from unusual causes at any one station.

In tropical climates, and in localities where the diurnal range of temperature is very great and irregular, the greatest possible care is necessary in the conduct of instrumental observations, more particularly with telescopic instruments, having movable adjustable diaphragms, containing spider-lines. Excessive humidity is inimical to perfect adjustment, and during the rainy season, in localities possessing wet and dry seasons, it is almost impossible to accomplish a day's journey without having recourse to frequent tedious and vexatious instrumental adjustments. These conditions will be found particularly prominent in country interspersed with belts of forest and open spaces, where the conditions of forest shade are not adaptable to those exposed to solar influence. The importance of closely watching instrumental changes under these conditions cannot be too strongly emphasised, for very serious errors are almost inevitable when this is not attended to.

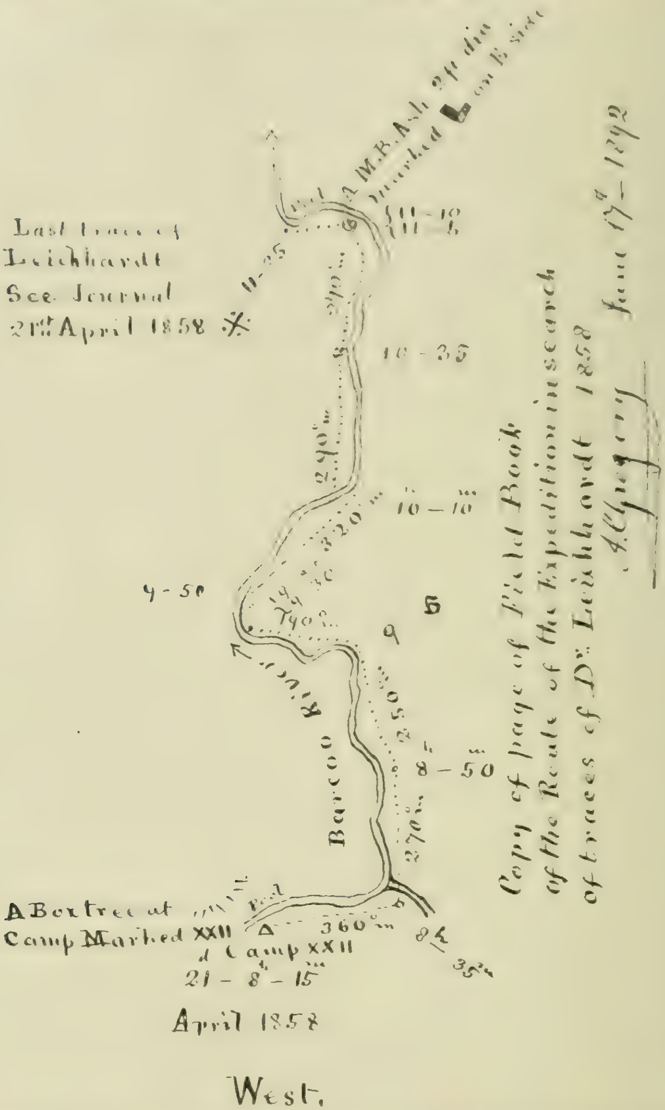
When Theodolites are used, it will be found advantageous to employ, instead of the usual cross-hairs of platinum wire or of spider's threads, a thin glass disc with the horizontal and vertical lines etched on it; the disc is readily fastened to the

diaphragm by cement. This form was used by the writer in field practise in excessively damp localities for several years, with most satisfactory results; he can therefore recommend it as being in every respect superior to the usual cross-hairs.

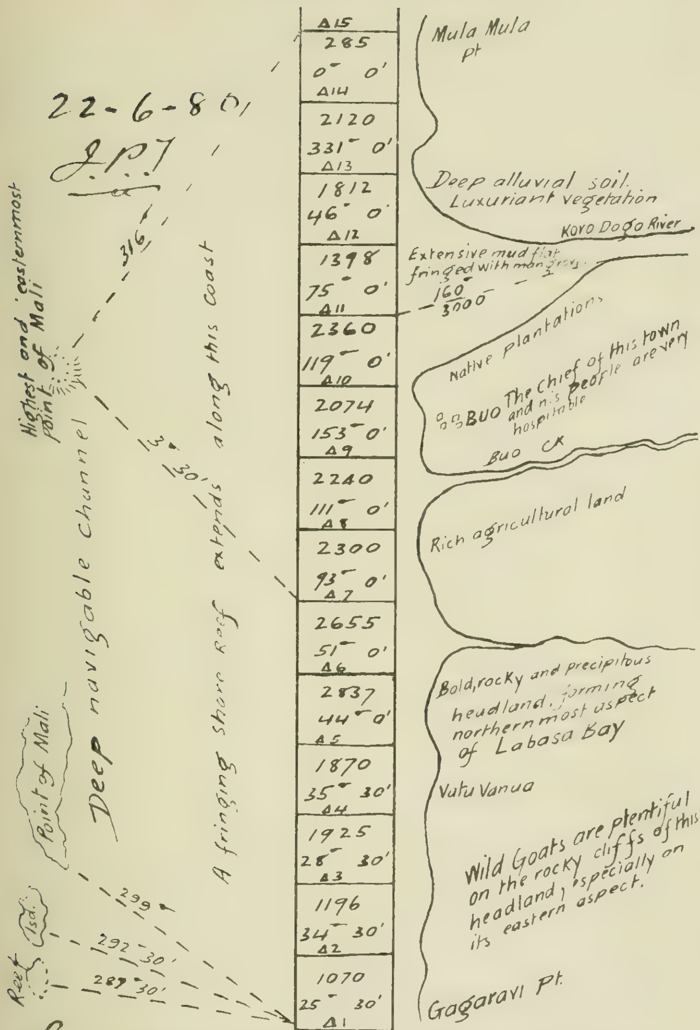
Field Books.—Not the least important in field practice is the method adopted to so record the operations as to avoid confusion, and to minimise errors in the cartographic department. It not unfrequently happens that field observations of the greatest value are rendered practically useless to the cartographer through careless and unintelligible entry in the field book. It is well known in the annals of exploration that, in many cases, the arduous labours of explorers have been deprived of much of their value by inability to even approximately locate their discoveries on the maps, and by not affording sufficiently reliable data to subsequently identify the features of the country. The following is a description of the way in which our veteran explorer, Hon. A. C. Gregory, kept his field notes:—Each page of the field book constituted a small sketch map, upon the face of which all minor features on or near to the route were delineated, together with a record of the actual course travelled. This was defined by straight lines, upon which were noted the bearings in degrees counted from zero to 360°; such as 45°, 90°, 270°, and 315°, as the case might be, the letters denoting the cardinal points being avoided entirely, thereby minimising errors in entry. The distances in time were recorded at the commencement of a line, and at the points where changes of bearings occurred; stoppages or other delays were indicated by bracketing the commencement and the end of the time lost as compared with the average rate of travelling. Supposing a course was travelled north-east from seven o'clock till half-past seven, when a change was made to East till eight hours fifty minutes, seven minutes having been lost in crossing a steep ravine, the entry in field book would indicate this in the following manner:—

7h. 0m.—45°—7h.—30m.

$$\left.\begin{matrix}90^\circ\ 7\text{h. }41\text{m.} \\ 7\text{h. }48\text{m.}\end{matrix}\right\}\ 8\text{h. }50\text{m.}$$



* *April 21st (1858)* * * * * * * "Continuing our route along the river (latitude 24° 35′; longitude 146° 6′) we discovered a Moreton Bay ash (*Eucalyptus sp.*), about two feet in diameter, marked with the letter L on the east side, cut through the bark, about four feet from the ground; and near it, the stumps of some small trees which had been cut with a sharp axe; also, a deep notch cut in the side of a sloping tree, apparently to support the ridge-pole of a tent, or some similar purposes; all indicating that a camp had been established here by Leichhardt's party. The tree was near the bank of a small reach of water, which is noted on Sir T. Mitchell's map. This, together with its actual and relative position as regards other features of the country, prove it not to have



This is copied from a page of my No. 1 field book, used by me in conducting the coast survey of Vanua Levu
J. P. Thomson — June 17, 1892

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been either one of Sir T. Mitchell's or Mr. Kennedy's camps, as neither encamped within several miles of the spot, besides which, the letter could not have been marked by either of them to designate the number of the camp, as the former had long passed his fiftieth camp, and the latter had not reached that number on the outward route, and numbered his camp from the farthest point attained on his return journey."

The illustrations represent what are probably the most convenient methods for recording field observations, whether made by the rapid explorer, the surveyor, or ordinary traveller. The distances shown in the latter may be assumed to represent any convenient unit of measurement.

In localities where rugged or broken surfaces render a circuitous route necessary, it will be found advantageous to record the average course in a direct line in the field book, so that, as far as possible, confusion may be avoided by the absence of numerous traverses over comparatively short distances. By this method, the route travelled will be indicated by a number of right lines, each denoted by its bearing in degrees and length in time, exclusive of delays, so that they may readily be delineated upon the map, together with all features in the neighbourhood.

Inseparable from the foregoing subject regarding route traverses, is the very important consideration of obtaining a satisfactory approximation of travelled distances. Upon this subject careful and patient attention should be bestowed, because, to the practical man, nothing is so unsatisfactory and annoying as to find, after a fatiguing journey, or on the completion of the survey of an inhospitable region, the positions determined astronomically and by dead reckoning, with aggravating persistency refuse to agree within reasonable limits. For reconnoitring purposes and for long journeys, either by land or by water, distances by time are the most convenient and practicable when actual measurements are inexpedient. To obtain satisfactory results from the recording of the time occupied in travelling in a given direction, an average hourly rate will require to be established. This may be most conveniently accomplished by the plotting of a whole day's journey in the direction of north and south, the hourly rate of three miles being assumed for that purpose. If the difference of latitude of the two camps agrees with the dead reckoning, the assumption of the hourly rate of three miles will be a correct one; but if on the contrary, it will become necessary to adjust the latter to the former by a proportional distribution of the existing difference. In determining

this standard of comparison, prevailing circumstances must receive careful consideration; especially the character of country, conditions of weather, men, and beasts of burden. This is a matter of some importance, for while this standard may be satisfactorily applied to subsequent daily journeys, *cæteris paribus*, a material variation from former conditions will render its modification necessary.

Dead reckoning should, on every possible occasion, and by every available means, be verified either by stellar, solar, or even lunar observations. As it frequently occurs, however, that an overcast sky and unfavourable atmospheric conditions render these irregular and uncertain, the bearings of all notable physical features of the country traversed should be carefully noted, their estimated distances recorded, and a faithful description of their characteristics given; special reference should also be made to the prevailing weather conditions. The latter subject is important, not merely from a climatological standpoint, but the general physical appearance and the apparent distances of distant objects are very considerably influenced by local atmospheric conditions. The bearings of distant objects are not only useful in providing a check on estimated distances travelled, but when carefully observed and well conditioned, they assume the form of a preliminary trigonometrical survey, by which we are enabled to locate prominent features by the method of intersections. For cartographic purposes they are also of special value in furnishing, what is, after all, the only safe material for the basis of a map of the country. The labours of the cartographer will likewise be facilitated if the geographical mile of 1 minute of latitude, equal to $92\frac{1}{2}$ chains, be adopted in the measurement or estimation of distances exceeding a quarter of a mile, instead of the statute mile of 80 chains.

In observing the bearings of distant objects from different positions, the necessity for the exercise of great care in the selection of well defined and recognisable features cannot be too strongly emphasised. If trees or rocks be chosen, they should be distinctive and not deceptive in character; if the head-

lands of a coast line be the objects of sight, they should be used only when unmistakable from others in their neighbourhood. The writer feels justified in dwelling earnestly on this subject, for his own experience, in frequently having tested the work of others, has repeatedly shown him that inaccuracies were, in the majority of cases, the result of *not* an inability to *observe*, *but* the want of power to *identify*; because objects assume different forms when viewed from different aspects.

In exploring broken and mountainous country bordering upon the coast line, preliminary steps should be taken to observe the bearings and angular distances of all prominent features from well selected stations on the sea-shore; if necessary, these stations should be connected by traverses, their positions defined by astronomical observations, and the maps of the country based upon them. To minimise errors, the subtended angles as well as the compass bearings from point to point should be observed, especially when the observations extend over extensive areas, the geological character of which renders great liability to magnetic complications unavoidable. To obviate these on inland journeys, where reference to coast line features is not possible, back sights should be taken at every change of bearing, and the necessary corrections for magnetic declinations applied to the new courses; by this means tolerably accurate results may be obtained when the ordinary prismatic compass is used. In preliminary triangulation for the purpose indicated, very acute angles should, if possible, be avoided, and manifold bearings radiating from any given point discouraged; the one favours inaccuracies, and the other has a tendency to confuse. When two courses are available, accept as a maxim that least associated with complications.

When examining extensive tracts of country, their classification and approximate areas should not be overlooked. Fertile valleys should be separated from sterile ranges; alluvial flats from hills; and mountain slopes from plains; some distinction should be drawn between forest and scrub; and green grassy patches should not be forced to mingle with jungle. These

should be carefully defined, and their areas judiciously approximated.

In marking trees near camping places, and at stations where important observations are conducted, care should be exercised in guarding against superficialness; this is an important part, both for subsequent reference and identification; it should therefore be thorough. The bark and alburnum should be removed from its side, and the marks cut deep into the wood of the tree: special consideration being given to their legibility. It might perhaps be better that this should be done under the personal supervision of the leader.

Concerning THE EXPLORATION OF COAST LINES, it should be understood that the physical configuration of the land frequently affords many coignes of vantage not usually met with in inland regions. These, if properly utilised, may furnish ready and convenient material for useful systems of triangulation. The initiatory stage of triangular operations should be marked by the adoption of a tolerably reliable base line, to which the general work should be referred; headlands and mouths of water-courses should be connected by bearings, and from these the bearings of all prominent inland features bordering upon the coast line should be observed, the intermediate features being merely a filling-in of details. These bearings should be so regulated that the positions from which and to which they are observed may be readily determined by the method of intersections. In tropical countries, where coast lines are fringed with coral reefs, much useful work may be accomplished by locating successive base lines over the surfaces of the reefs: from the termini of these angles of elevation may be observed, for the purpose of determining heights of elevated seaboard features, and checking barometric measurements. These base lines may be expeditiously and accurately measured at low water, by steel bands of five, ten, or even twenty chain lengths. When connecting coastal features by these means, adjacent islands and neighbouring rocks should also receive attention: their positions being carefully observed from convenient headlands, their

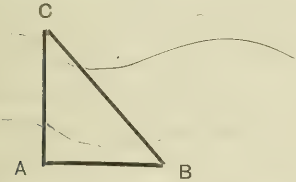
leading features approximately delineated, and their areas estimated.

In examining country bordering upon or accessible to railroads, advantage should also be taken of the facilities they frequently afford for easy measurement. A moderately level and straight section of railway will form a favourable site for the measurement of a base line; the operations should be conducted along a line of rail, by stretching the tape on the surface of the rails, and marking each length by a sharp and hard pointed instrument.

Regarding THE SURVEY OF RIVERS AND OF CREEKS, to which former reference was made, it seems proper to state that, while a useful object may be accomplished by the approximate measurement of the sinuosities and general trend of a stream for cartographic purposes, other observations requiring no special skill and entailing no tedious computations may be made that will materially add to the value of final results. It is, the writer maintains, an improper application of power to consume precious time and means in navigating or traversing water-courses, when the results comprise nothing more than meagre data for mapping. This unhappily applies to the majority of cases; if current geographic literature be consulted, it will generally be noticed that accompanying local maps simply show approximate width and direction of stream, with occasional reference to remarkable features, especially rapids and waterfalls. Seldom is any attempt made to indicate channels most suitable for navigation; it is very unusual to find any information concerning the character of channel beds, the depth and volume of water, and velocity of current. Surely it is most useful to know the volume of water passing through a river channel; during periods of rain it affords valuable data for estimating the rainfall over a given area; and in dry seasons it indicates the approximate value of the water resources of the country.

To obtain this information, cross sections should be taken at convenient places by measuring width of stream, depth of water, and velocity of current. The former may be accomplished in the following manner, by the simple method of perpendiculars,

when the stream is too wide for measurement otherwise. From the observing station A, select some distinctive feature at C; lay-off and measure AB at right angles to AC, and observe the angle ABC. In the right angled triangle ABC, there are given the angles and one side to find the perpendicular AC, which = the width of river. When circumstances render the measurement of a right angled triangle impracticable, an oblique triangle will give the same results. A sounding line or pole requires to be used for depth of water, and velocity of current may be determined by measuring a given part of the river-bank, defined by marks; a floatable substance being cast into the current, the time it occupies in drifting over the measured distance should be carefully noted; by this means the velocity per hour, or fractional part of an hour, may readily be determined by simple proportion. During periods of rain, either in the form of heavy thunderstorms or continuous downpours, the volume value of a given rainfall may be determined by measuring the augmented cross section of waterway due to the highest rise of a river. In performing this operation the observer should be careful to guage from the normal level of the stream.



Latitude and Longitude.—The determination of positions, astronomically, is an important and necessary part of an explorer's duty. Estimated positions may be obtained by the method usually called "*Dead Reckoning*;" but, when necessity demands greater accuracy, latitude and longitude have to be obtained by the observation of celestial objects. In recommending a selection of these, the writer is not altogether insensible of the fact that it were almost as impossible to offer suggestions that would meet with general acceptance as it were to secure universal concurrence in an individual opinion of the laws that regulate the life and affairs of mankind. It must therefore be understood that the following remarks aim at helping and guiding travellers,

with limited means at their disposal, for the conduct of astronomical observations in regions outside the limits of settlement. Being simple and familiar, both to the amateur and professional observer, they are not likely to confuse and delay when practised.

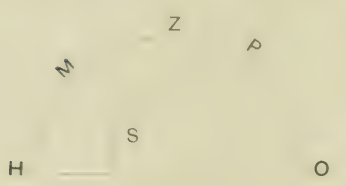
For the determination of latitude, stellar observations should be conducted; the objects chosen being the planets and stars of the first, second, and third magnitudes. These are easily identifiable—the former from the latter, when distant from the horizon, by the absence of the familiar twinkling; while the latter are distinguishable from one another by the characteristic constellations they occupy. Thus, in the northern hemisphere, we have the well defined constellations of Ursa Major, Cassiopea, Cepheus, Cygnus, Draco, and Auriga. In the southern heavens, the beautiful circumpolar constellations of Crux, Centaur, Argo, and Eridanus. Planets may be distinguished from one another by consulting their ephemerides in the Nautical Almanac, and noting the times of their passages over the meridian of Greenwich; these, to correspond with local time, will simply require correction by a plus or minus quantity, determinable by the longitude of the place of observation, east or west of the Prime-Meridian as the case may be.

To the mariner, the sun may be a convenient object to observe, but with the explorer, who is usually on the march at the time of its meridian passage, the case is altogether different: because a midday halt for the purpose of conducting observations might cause great inconvenience, loss of time, and confusion. Even were these objections obviated, the sun's position, either north or south of the equator, renders the detection of errors—by the observation at the same time of an object having an opposite declination—impossible. Besides these, another serious obstacle presents itself, for, in tropic regions, the sun's zenith distance at its meridian passage is so small, that its altitude cannot be measured by the ordinary sextant when the use of an artificial horizon is necessary.

In conducting observations of meridian altitudes, stars should, if possible, be selected with altitudes almost as great as the

sextant used is capable of measuring, so as to minimise corrections for refraction; several sets of observations should be made of north and south declination stars, and the mean of the whole taken. A place should be selected near the camp where a north and south zone of the heavens is unobstructed by trees, and where the smoke and glare from the camp fire will not be likely to interfere with the observations; at this place an approximate true north and south line should be laid down by compass, making the necessary allowance for variation, and its position defined by a picket, or by some convenient object that may be easily recognised in the dark. By this means stars, when approaching the meridian, may readily be identified, and their altitudes conveniently observed; this also has the advantage of obviating the necessity of long and tedious waiting for objects to culminate, when the apparent position of meridian is unknown. When the star is north of the zenith, with declination north, the latitude $=90^\circ-$ true altitude $-$ declination; with declination south, the latitude $=90^\circ-$ true altitude $+$ declination. When the star is south of the zenith and above the visible pole, the latitude $=$ true altitude $+$ declination -90°; if below the pole, the latitude $=$ true altitude $-$ declination $+90^\circ$. When existing conditions render the observation of meridian altitudes impracticable, the latitude may be deduced by observing the single altitude of a star when off the meridian, the time of observation being known. When favoured by circumstances, the observations should be conducted during the interval between sunset and dark, when the atmosphere is usually less disturbed by excessive radiation and condensation of vapour than at a later hour of the night. In hot climates, where great humidity and heavy dews are usually experienced, it will be advantageous, and even more reliable, to apply this rule on every favourable occasion. Metal instruments are then comparatively unaffected by the dampness of night, and no illuminating agent is required, either for reading the verniers, or, in the case of telescopic instruments, for distinguishing the cross hairs. Planets and first magnitude stars may always be seen during twilight when unobstructed by clouds.

The following formulæ are applicable to the method of determining the latitude by a single altitude.* HO represents the horizon of the place of observation; Z represents the zenith, P the pole, S a star. In the spherical triangle, ZPS, there are given PS$=90°-\delta$ (declination), ZS$=$Z (zenith distance), and the hour-angle ZPS, to find PZ.



Let fall the perpendicular SM, from S, upon PZ produced, and we shall have

$$R \cos. P = \text{tang. } PM \cot. PS = \text{tang. } PM \text{ tang. } \delta.$$

Hence $\quad \text{tang. } PM = \cos. P \text{ (hour angle) } \cot. \delta \; . \; . \; . \; . \; . \; . \; . \; (1)$

$$MZ = PM - PZ = PM + \phi - 90$$

Also, $\quad \cos. PM : \sin. (PM + \phi) :: \sin. \delta : \cos. Z.$

Hence $\quad \sin. (PM + \phi) = \dfrac{\cos. Z \cos. PM}{\sin. \delta} \; . \; . \; . \; . \; . \; . \; . \; . \; . \; . \; (2)$

The value of PM is furnished by equation (1), and that of PM$+\phi$ by equation (2). Their difference is ϕ, the required latitude. This method, which should not be adopted otherwise than as an alternative, may only be relied upon for satisfactory results when the object observed is near the meridian.

The Determination of Longitude is a problem associated with divers methods, and with so many nice complications, that its establishment by the explorer cannot be regarded otherwise, even when surrounded by favourable circumstances, than as an approximation to the truth. For nautical purposes, the method of lunar distances has long been in use, the facilities afforded at sea having favoured its adoption, the results in many instances being fairly satisfactory. As it is not, however, the writer's intention to advocate its use in this instance, reference need only be made to what appears to be the most practicable method both for convenience and applicability. The traveller should provide himself with one or more reliable chronometer watches,

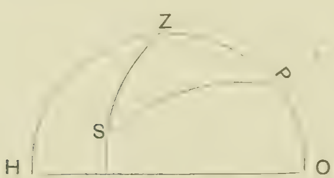
* *Loomis's Practical Astronomy, p. 148.*

properly rated and adjusted to the mean time at Greenwich, or at some other convenient initial meridian. When two watches are carried, one should be a sidereal timekeeper, and the other should indicate mean time. It should always be borne in mind that the rates of chronometers are more or less influenced by the conditions to which they are subjected. For instance, the rate of a chronometer when at rest will very probably undergo a marked change in transportation, whilst climatic variations may also affect the mechanism of a delicate timekeeper to an appreciable extent. This is what actually occured within the writer's experience in 1882, when conducting the observation of the Transit of Venus at Levuka, Fiji. On this occasion, the chronometers used were at first stationed in the Harbour Master's office, where their rates were carefully determined by astronomical observations. About two weeks before the date of the Transit, they were transported with the greatest possible care to the observatory on a hill top, not farther than about 220 yards from their former position. Here they were embedded in sawdust, on a solid foundation, in the centre of the observatory floor. After careful observations, it was found, however, that not only had a slight change occurred in transit, but, their rates were not exactly coincident with those indicated at the Harbour Master's office. It should nevertheless be stated that, whilst in the observatory, where the daily range of temperature was extreme, the rates were uniform. These indicate conditions that require the careful and diligent attention of the traveller, who should apply every available method for the ready and prompt detection of the slightest variation from the truth, arising either from accidental or local causes. Before setting out from the last stage of settlement, the timekeepers should be frequently compared with the local standard time, and at every subsequent stage of the journey, the rates should be checked by observing either equal altitudes or single altitudes of stars when off the meridian; several sets of observations made consecutively, at equal intervals of time, being essential to success. To determine the longitude of a place east or west from the meridian to which the watches have

been adjusted, local time requires to be found; the difference of longitude being equal to the difference between local time and corrected chronometer time.

Local Time may readily and conveniently be determined by carefully observing the single altitude of a star when east or west of the meridian, and noting the exact instant of time by chronometer; probable errors in latitude may be eliminated by observing stars of north and south declination, and those whose paths lie near the Prime vertical. Probable instrumental defects should be minimised by the adoption of the mean of several successive sets of observations of each object. When the weather is favourable, and clouds are absent, local time may also be found by observing equal altitudes of a star on opposite sides of the meridian.

Given the latitude of the place of observation, the declination and corrected altitude of a star, its hour-angle (P), or distance from the meridian, may be computed by the following formula:—*



PZH = the meridian of the place of observation, P, Z, and S, represent the pole, the zenith, and the position of the star. The three sides of the spherical triangle, ZPS, are known, namely:—PZ = 90° − latitude = the co-latitude = ψ; ZS = 90° − true altitude = the zenith distance = z; PS = 90° − declination = the polar distance of the star = d.

The hour-angle ZPS may be computed thus:—

$$\sin.\ \tfrac{1}{2}\,P = \sqrt{\frac{\sin.\ (S-\psi)\ \sin.\ (S-d)}{\sin.\ \psi\ \sin.\ d}}$$

$$S = \tfrac{1}{2}\ \text{sum of}\ d + z + \psi\ .$$

If when observing the altitude of a star for local time, its magnetic bearing is also noted, the declination of the needle may readily be determined by comparing the magnetic azimuth with the true azimuth of the star, as indicated by its hour-angle

*Loomis's *Practical Astronomy*, p. 1[illegible].

in degrees. This will be found advantageous by economising labour in computing, and in obviating the necessity of observing elongations and amplitudes.

As a check on the longitudes deduced by the foregoing method, the traveller should embrace every favourable opportunity of obtaining lunar observations. This method of determining longitude necessarily involves a somewhat lengthy calculation, but, this should not deter an observer from recording observations when opportunities offer. If unable by prevailing circumstances to reduce them in the field, the calculations may be conveniently wrought out by an office computer at the end of a journey.

In submitting this paper to the Queensland Branch of the Royal Geographical Society of Australasia, the writer was actuated by a desire to indicate, in as clear and concise a manner as its limited scope will permit, that which is calculated to aid the explorer.

In conclusion, it only remains for me to express my obligations to our esteemed President, Hon. A. C. Gregory, C.M.G., and to your Excellency and gentlemen, my very hearty thanks for your indulgence.

Discussion.

The President (Hon. A. C. Gregory) said he thought they might thank Mr. Thomson for his very elaborate paper upon the very important subject with which he had dealt that evening. He was satisfied that they would all agree with him in thanking Mr. Thomson for the labour that he had taken in producing such a paper. He was afraid that that evening they would hardly have sufficient time to give it full discussion. He would merely refer them to the two most important instruments to a person travelling about. These instruments are the Box-Sextant and Prismatic Compass. When he was about to start his exploration expedition in Northern Australia, his old chief in West Australia presented him with two of those instruments, and told him that

wherever he might be he could fix his distance and ascertain his time by their means. His chief added that he would no doubt be supplied from England with two or three cwt. of instruments of great variety, but he would find that most of them had best be left at home. The two instruments which he should always take with him, which should be his constant companions, were the two instruments which he referred to. With those two instruments, he (Mr. Gregory) could find out the time and fix his position; and that without reference to anything else. That showed what assistance those instruments could be to a person. It was singular that tea, after being boiled and allowed to cool, was perhaps the best reflector they could get in the bush, because it was less liable to bubbles or other variations than any ordinary water such as they got in the bush. The perfectly level surface which it afforded, enabled them to get a reflection far truer than could be obtained by different means. Having ascertained the position of the sun on the horizon, all that was necessary to work out by means of the tables, was the time and position which the traveller desired to ascertain.

An excellent way of taking food for an expedition, where game could not be relied upon, was in the form of horses. They then had not only its services whilst alive, but afterwards its flesh and skin to rely upon. Having eaten the former, they could take the skin, scrape it, cut it into narrow slips or squares, and dry them in the sun. These could then be packed away for future use. Soaked in water and cooked, these squares came very acceptable, and indeed, there were many things which explorers enjoyed that very few people had an idea about. Another way was to take preserved meat and mix it with flour and water, and bake it in the form of biscuits. It was wonderful what a capacity such food had for sticking to the ribs. [Laughter.]

Mr. Thomson said that, before closing the meeting, he wished the gentlemen present to join with him in thanking Mr. Gregory for lending the instruments that he (Mr. Thomson) had used that evening. Without the aid of these, he would have been put to great disadvantage indeed. He was sure they would also

thank Mr. Gregory heartily for the trouble which he had gone to in explaining them, and giving some of the reminiscences of his exploring days.

His Excellency Sir Henry Norman said he was sure that they all thanked Mr. Thomson for producing instruments which were so interesting, and field books which were so wonderfully well kept, and so wonderfully well preserved. He was sure they all thanked the lecturer for his lecture which he had taken so much pains with. He looked round and saw a great many scientific gentlemen there, and no doubt they understood the lecture more than he had. Mr. Thomson was good enough to call him a celebrated traveller. He had certainly been a good deal over the world, but he could not call himself or lay claim to being a celebrated traveller. He was a perfectly unscientific traveller, but he had always carried with him his aneroid and thermometer. It seemed to him that a lecture to unscientific persons would be of great use. There were many who, like himself, as they went about the world took their observations, and, if they received instruction, might turn their travelling to good purpose. Of course, in England, the Royal Geographical Society gave instructions to gentlemen who were going to travel, and such instructions were generally given to gentlemen going more or less as travellers in the interior of Africa, or something of that kind, and they were instructed in the use of the various instruments. But he thought they were, as a rule, scientific travellers and experienced explorers, like his friend on the left (Mr. Gregory), and many eminent travellers; not gentlemen who went about the world like himself, who had no claim to be considered scientific. Such gentlemen might, with advantage, when setting out on their travels, be put on the right track by useful information. He remembered, when a young man, going to a station on the Himalayas, at which there was a very scientific officer. The question arose whether there were any glaciers on the Himalayas; Professor Forbes, at that time, believed that there were none. He (His Excellency) having to go into the interior of the Himalayas, the

officer he had referred to said to him: "You are going into the region of glaciers, note such and such things: if you see them, and they answer these conditions, they are glaciers." He (His Excellency) went into the interior and came across one or two glaciers, and when he returned he described what he had seen to his scientific friend, who told him they were true glaciers, and he would write to Professor Forbes about them. The evidence of the existence of glaciers was overpowering, and it was, he believed, admitted by Professor Forbes. Soon after that, the father of his present aide-de-camp (Captain Strachey), who was one of the greatest meteorological and geographical authorities in the world, went there and had confirmed his (His Excellency's) information. There were perhaps thousands of glaciers in the Himalaya Mountains, so that if they could get a little more instruction in scientific matters, they would be able to make proper observations, and he dare say there might be some good results achieved. He was sure he heartily joined in with the President in what he had said about the lecture. He considered they were very much indebted to the lecturer for the interesting and very complete address which he had given. As he had said, it was rather more for scientific than for unscientific persons, and he trusted that some day Mr. Thomson would deliver a short and concise address to unscientific travellers. [Applause.]

Mr. THOMSON said he wished to express his cordial thanks for the kindly sentiments which they had expressed towards him. He would certainly consider the advisableness of acting upon His Excellency's suggestion. He thanked them for the way in which they had appreciated his lecture, and he could assure them that he felt it a very great honour to have been able to deliver it before Mr. Gregory and His Excellency, who were both renowned travellers.

The proceedings then terminated.

ANNUAL MEETING.

The seventh Annual General Meeting of the Royal Geographical Society of Australasia, Queensland Branch, was held in the Museum Library, Brisbane, on the evening of Friday, July 22, 1892, at 8 o'clock. The President, Hon. A. C. Gregory, C.M.G., M.L.C., F.R.G.S., occupied the chair. On his right was seated the Vice-President, Mr. R. Gailey.

Letters of apology for non-attendance were read from His Excellency the Governor, and from Captain Almond, Port Master.

The Hon. Secretary also read the following letter :—

Sydney Observatory, June 29th, 1892.

The Secretary Royal Geographical Society of Australasia, Queensland.

My Dear Sir,

I have to acknowledge the receipt of your letter of June 18th, conveying to me the very gratifying information that the Royal Geographical Society of Australasia, Queensland, have done me the honour, by unanimous vote, of electing me an Honorary Corresponding Member.

Will you kindly convey to the Council and Members of the Society my very cordial thanks for the honour they have conferred upon me, and may I add that it came quite as a surprise. It is true that I have given with pleasure some assistance in fixing the boundary between Queensland and New South Wales, the longitudes of New Zealand, New Guinea, and various places in Queensland and New South Wales, but I think these small services must have been viewed with a very generous magnifier in order to seem worthy of the honour conferred.

Believe me, yours very truly,

H. C. RUSSELL.

Mr. Sandford Fleming, chairman of the Special Committee on Uniform Standard Time, Ottawa, Canada, wrote thanking the Hon. Secretary for the receipt of copy of the paper read by him at a meeting of the Society, on "Universal Time Measurement."

The Hon. Secretary reported that amongst other valuable donations received during the past month was a gift of books

from Mr. W. Soutter on the Geological and Natural History Survey of Canada.

Mr. GAILEY moved a cordial vote of thanks to Mr. Soutter, and expressed a hope that other gentlemen would follow the example he had set. He also trusted that during the present year they would be able to find a resting-place for their library.

Dr WAUGH expressed a similar sentiment, and after the motion was agreed to, Mr. SOUTTER briefly responded.

Mr. SOUTTER hoped the Society would not allow the subject of uniform standard time to be lost sight of. He trusted means would be taken to impress the necessity for its adoption on all the colonies. Wherever it had been adopted it had been an unqualified success, and he suggested that steps should be taken to bring it before the Railway Commissioners and the Government itself.

The PRESIDENT said he thought they might urge the Government to do something in the matter. Legal gentlemen had told him it was impossible to deal with the matter until it had been made legal; but that was soon got over by an enactment.

The HON. SECRETARY said he had sent copies of Mr. Fleming's letter, and of the pamphlet issued by him, to the Chief Commissioner for Railways and to the Postmaster-General. Mr. Mathieson had replied that he hoped to see the system in use throughout Australia before long.

Report of Council. Session 1891–92.

The Council has the honour of submitting to the members of the Queensland Branch of the Royal Geographical Society of Australasia the following seventh Annual Report upon the operations of the Society during the preceding official year ending June 30, 1892:—

Notwithstanding the removal of the names of defaulters from the roll of members, the numerical strength of the Society has been fairly well sustained by the accession of a greater number of supporters than was recorded during the previous year. In

all, twenty-one new members were elected. The Council would, however, be glad to welcome a much larger increase to the ranks of the Society, and with that object in view the members are cordially invited to make known to their friends the privileges and advantages of membership. A slight effort in this direction would doubtless result in a very substantial addition.

Finance.

The following Balance Sheet is submitted:—

ROYAL GEOGRAPHICAL SOCIETY OF AUSTRALASIA (QUEENSLAND BRANCH).

Financial Statement for the Year ending 30th June, 1892.

Dr.	£	s.	d.	Cr.	£	s.	d.
To Balance in Q. N. Bank, 30th June, 1891	119	4	1	By Printing the Proceedings and Transactions of the Society	121	9	6
„ Entrance and Diploma Fees	23	8	0	„ Printing Circulars and Post Cards, and the purchase of Stationery and Postage Stamps	36	1	1
„ Life Subscriptions ..	21	0	0	„ Reporting Proceedings ..	12	8	0
„ Annual Subscriptions, &c.	107	19	6	„ Caretaker of Museum for attendance	2	0	0
				„ Advertising	0	16	3
				„ Commission to Collector ..	1	7	3
				„ Sundries	2	11	3
				„ Balance in Q. N. Bank, 30th June, 1892..	94	18	3
	£271	11	7		£271	11	7

CHARLES B. LETHEM, *Hon. Treasurer.*

I have compared all the Vouchers, Cash Book, and Bank Pass Book, laid before me by the Hon. Treasurer, and found the same correct.

WARREN WEEDON, *Hon. Auditor.*

Brisbane, 13th July, 1892.

The financial condition of the Society, as represented by the Hon. Treasurer's statement of accounts, is satisfactory and reassuring, considering the general depression throughout the colony.

Meetings of the Society.

Nine meetings of the members were held altogether; of these one was the anniversary meeting and one a special general meeting, convened for the purpose of receiving an address on

British New Guinea by our member, Captain Michael. Six papers were read at these meetings, and an interesting address was delivered by our distinguished patron, his Excellency the Governor of Queensland, on the Hobart meeting of the Australasian Association for the Advancement of Science. To the authors of these the Council desires to offer its best thanks.

Council Meetings.

The Council met twelve times during the session; of these ten meetings were held for the purpose of transacting the general business of the Society, and the remaining two sittings were occupied in dealing with special matters, particularly in making arrangements for a fitting reception to Mr. H. M. Stanley on his arrival in Brisbane. On that occasion the members of the Council were much gratified to have conceded to them the honour of presenting to Mr. Stanley an address of welcome on behalf of the Society.

Publications.

The Society's volume of "Proceedings and Transactions" has been published as usual to members and to kindred institutions throughout the world. The Council embraces this occasion of intimating what is probably not generally known, that in addition to those circulated amongst members and cognate societies aforesaid, a liberal supply of each issue of our publication is despatched to our sister branches in Sydney, Melbourne, and Adelaide for distribution to their members. The Council is again pleased to note the increasing demands for back and current numbers of the Proceedings of the Queensland Branch of the Society. These are chiefly made on behalf of State and public libraries, and by kindred societies that offer their publications in exchange.

Library.

The library of the Society has been greatly enriched during the session by valuable accessions from private donors, foreign governments, and kindred institutions. While offering the

cordial thanks of the Society to all, the Council desires to especially acknowledge the valuable gifts donated by the President, Hon. A. C. Gregory, and Mr A. W. Jardine. The Council is again obliged to express regret that no proper repository is yet possessed by the Society for its very valuable library of scientific works. As formerly, the Council has pleasure in offering the best thanks of the Society to the Trustees of the Queensland Museum for the use of the library of that institution, and to the Curator and his staff for their uniform courtesy in offering every facility to the officers of the Society at the meetings.

EXPLORATION.

While regretting the present disorganisation of the Elder Scientific Expedition to Central Australia, the Council is still hopeful that Sir Thomas Elder will see his way clear to continue his noble enterprise, when a more favourable season may crown his efforts with success. A hope is likewise expressed that satisfactory arrangements may yet be made for despatching the proposed expedition to our Antarctic regions.

GENERAL.

The Council is glad to announce that the efforts of the Society in advocating a reformation in the measurement of time have met with the very cordial and general support of cognate societies, as well as of private scientists. The initiative was taken by our Hon. Secretary, through the medium of a paper read by him at one of the meetings of members on the subject of "Universal Time Measurement." After being published in our "Proceedings and Transactions," it was circulated to all parts of the world. This had the effect of eliciting very wide and authoritative opinion upon the subject from very eminent men of science. The Government Astronomer of New South Wales, Mr. H. C. Russell, in a letter to our Hon. Secretary, states that he urged the Railway Commissioners to adopt zone time for railway purposes, and he would be glad to see it in general use, but that the Crown law officers of the colony decided that it was illegal

to do so—a difficulty easily dissipated by the passing of a short Act of Parliament. The Chairman of the Special Committee on Uniform Standard Time, Mr. Sandford Fleming, of Ottawa, Canada, who was chiefly instrumental in inducing the Imperial Government to take the matter up, also writes to our Hon. Secretary, stating that the 24-hour notation will be adopted throughout America on the 12th August next. In Belgium, Mr. Fleming says, the system was adopted by law on May 1st of this year, and it is now in use in contiguous countries from Belgium to Turkey.

At the meeting of the Australasian Association for the Advancement of Science, held at Hobart this year, the Society was efficiently represented by his Excellency Sir Henry Norman, to whom the best thanks of the Council are due.

For the Council,

J. P. THOMSON,

Hon. Secretary.

On the motion of Mr. R. GAILEY, seconded by Mr. D. S. THISTLETHWAYTE, the Council's Report and Balance-sheet were adopted.

Anniversary Address.

By the Hon. A. C. GREGORY, C.M.G., M.L.C., F.R.G.S., ETC., *President.*

During the past year little has been achieved in the exploration of Australia, so far as applies to new tracts of country, although some valuable work has been done in the compilation of maps of the occupied portion of the continent. This division of geographical science is therefore not available as a subject of an annual address, consequently I have had to look to some other division of the science which this Society has been formed to promote, and, in seeking for a suitable subject, it has become apparent that, in our eagerness to discover the features of new tracts of country which do not alter their character for ages, we have to some extent neglected to study the characteristics of the inhabitants, their traditions, and customs, before intercourse with civilised races has operated to modify the ideas of the aboriginal

Australian. I would, therefore, impress on those who have had opportunities for intercourse with the unsophisticated tribes, that it is important that some record may be made of their social and moral condition before they cease to exist, except as a menial race, subordinated to the European who has annexed their territory.

I have frequently heard it stated that the Australians are of such a low type of the human family, that they are scarcely in advance of intelligent animals; that their manners and customs might be summed up in the form adopted by a naval officer who had been instructed to observe the manners and customs of the inhabitants of Western Africa, when his report was: — "Manners, none: customs, beastly."

My own experience among the Western tribes has, however, tended to the conclusion that, so far as they can be compared with the uneducated classes of Europeans, their intelligence is fully equal, that their moral code is quite as well observed, that they have ideas of a future state, and that they have an elaborate system of fables or mythology, in which the animals take as great a part as the man and converse together.

As regards their ideas of a supreme being, it would seem that, though they recognise his existence, he has no specific name, but is always spoken of as the maker of all things, all his acts are for benefit and good, and therefore not feared. One of their myths refers to the creation of the first black-fellow and gin, and was narrated in the following form as nearly as it is practicable to translate:—

When the maker decided to form mankind, he took plastic clay and moulded first one leg, one arm, and half the head and body, then the other half was fashioned, and the two parts put together; but in closing the line of junction, there proved to be somewhat too much material, and part had to be removed by dexterous manipulation. Therefore, when the woman was to be formed, the maker determined to avoid the mistake of using too much material, and took a less quantity of clay, proceeding as in the case of the man; the quantity proved to be insufficient for a

correct copy of his first work, and some difficulty occurred in adjusting the two halves together: and thus the female was smaller, and did not quite correspond with her mate.

The evil spirit has a designation as "Jarnack," which is freely used: and he is deemed to be the cause of all bad things, loving to prowl about in the dark, and generally simulating the human form. Jarnack is greatly feared, and is frequently sought to be propitiated by many minor superstitious acts, such as throwing grass or rushes on particular spots, generally isolated rocks. He sends thunderstorms, breaks the limbs off trees when men are climbing for opossums, or when people are beneath, makes men fall down in rocky places, &c., &c., causes many kinds of sickness, but is not generally supposed to be the cause of death by disease, which is usually ascribed to the magic of some individual of one of the neighbouring tribes, and to be avenged either on the supposed author or some other member of the tribe.

Their ideas of a future state are exceedingly vague, but the general tending is that, after the spirit has lingered in or near the grave for a time, it crawls over the ground for a short distance, leaving a slight trace, and then flies through the air across the ocean, and since the advent of the white man, it would appear the idea has arisen that they are the re-embodied spirits of the deceased blacks.

According to some of their fables, both men and animals have been translated to the celestial regions, and are now represented by stars, of which the following myth is an illustration:—A black-fellow named Boylyak, went out from the camp to hunt, and after a long day's toil succeeded in spearing an emu, and was carrying it to the camp when he met a woman named Taloa, who persuaded him to come to her hut; and contrary to the established law which requires all large game to be taken to camp for the general benefit, the two feasted on the emu that night and the next day. Being afraid to return to the camp after such a breach of the rules, he continued to sojourn with his lady friend. Such prolonged absence caused his brother to fear some accident had occurred, and he went out to seek

Boylyak, and, after a protracted search, discovered him in a sorry plight, very ill from the effects of his excessive indulgence in feasting on the emu, and otherwise; and the brother had to carry him on his back to camp, where, after lingering for some time with his bones all on fire, he died, and went up to the sky and was changed to the star Sirius. Now, Sirius is a conspicuous star in the early evening about the vernal equinox, and as the wet season in that district soon follows, the star is supposed to have control of the rainfall, and Boylyak determined to be avenged on Taloa for the mischief she had caused him, and caused the rain to be withheld, and the drought became so severe that all the waters dried up; and as Taloa was wandering over the arid country, hoping to find some spring at which to quench the thirst of herself and child, suddenly a pool of clear water appeared at the foot of a high rock. Taloa rushed towards the spring, but, as she approached, the water receded under the rock; and, after a vain attempt to obtain it, was departing in despair, when, giving a last look, the water welled up and formed a pool again, but gradually decreased as she returned; at length, being unable to reach the water with her hand, she tried the expedient of sucking it through a tube formed of the leg bone of a kangaroo, and crept as far as possible under the rock, when Boylyak caused it to fall and crush both Taloa and her child. Then Taloa, the child, and the emu, were translated to become stars; the emu being designated by the Southern Cross, and the river on the banks of which the emu was walking when speared by Boylyak, is represented by the Milky Way.

In another light the animals converse in much the same manner as in our own fables, and it may be premised that the owl personates our goose or ass; and the kangaroo rat, which is reputed to be the most clever of animals, because he builds a house to live in, takes the place of our fox.

Now the first black-fellow was fond of roast opossum, but after each meal had to lengthen his belt, and, unfortunately, neither Eno's Fruit Salt nor Beecham's Pills were in the market, and the condition of the lord of creation was becoming critical.

One day, as the black-fellow was sitting at his fire roasting pieces of opossum, the owl and kangaroo rat met in the bush in the rear, and after exchanging remarks on the state of things in general, the kangaroo rat pointed out to the owl the bone awl with which the black-fellow had been sewing his skin cloak, and suggested that it would be an amusing practical joke to put the bone, with the sharp end up, underneath the black-fellow next time he leant forward to take some of the meat from the fire. The owl said the bone would not stand upright of itself. The rat said "you hold it up," and at the same time withdraw somewhat. The owl acted on the suggestion, and the black-fellow sat down on the bone awl. There was a catastrophe which does not admit of translation, and the rat was the only one of the three who escaped unharmed.

Now, though it is probable that, in the narration of these fragments of folk lore, the speakers often vary materially from the original, and follow their own fertile imaginations, yet the main point is that the aboriginal mind is nearly equivalent to that of more civilised communities, and that the same mental capacity exists in regard to abstract ideas, though the details of description are, of course, modified to suit the surroundings in each phase of civilisation. Therefore, it is not because these fragments of aboriginal fiction have any intrinsic merit that I have placed them before you, but as evidence of the parallel lines of thought which exist under opposite conditions of mental culture, and also as a record of the pure aboriginal traditional fiction, which must, ere long, be subject to deterioration through amalgamation with ideas imported by the now dominant races, whose manners, customs, and forms of expression, especially the objectionable parts, are rapidly assimilated by the aboriginal.

Hitherto it has been customary to assume that the primitive condition of the Australian is the result of an incapacity for civilisation, but, if it could occur that Australia should be absolutely isolated from the rest of the world, the tendency of the future generations of its inhabitants would be to descend nearly, if not quite, to the lowest of the aboriginal.

First, disagreements between provinces would lead to incursion, reprisal, war, devastation, the annihilation of manufactories and agriculture, culminating in a nomadic race, which might or might not subsist on flocks and herds, under conditions presenting little, if any, improvement on that of the original races we are now supplanting.

Major BOYD moved a hearty vote of thanks to the President for his interesting address, and congratulated him upon having departed somewhat from the ordinary routine of presidential addresses, for the result had more than justified it.

Mr. J. FENWICK seconded the motion, remarking that up to the present time he had not thought the Australasian Colonies had much history, but the President's anniversary address showed that research was amply repaid.

The HON. SECRETARY, in supporting the vote, said the only fault with the paper was that it was too short.

The motion having been carried by acclamation,

The PRESIDENT responded. He remarked that his address had been prepared not so much with the object of providing something amusing or extraordinary, as to give a clearer insight into the internal economy and customs of the aboriginal races, so that they might be induced to look further into their myths and romances.

The ballot for Officers and Councillors of the Society for the Session 1892-93, resulted in the unanimous election of the following gentlemen :—President : Hon. A. C. Gregory, C.M.G., M.L.C., F.R.G.S. ; Vice-President : R. Gailey, J.P. ; Hon. Treasurer : C. B. Lethem, C.E. ; Hon. Secretary : J. P. Thomson, F.R.S.G.S., &c. ; Members of Council : J. N. Waugh, M.D., P. M'Lean, J.P., Major A. J. Boyd, W. Castles, J.P., W. Allan, M.L.A., F.R.G.S., Captain T. M. Almond, F.R.A.S., J. Fenwick, J.P., D. S. Thistlethwayte, C.E. ; Hon. Auditor : Warren Weedon.

Mr. LETHEM moved a vote of thanks to the retiring members of the Council, and the motion was seconded by Mr. GAILEY, who remarked that the duties which a councilman was asked to

perform were of an important character, as the ramifications of the Society covered the whole world's surface. He hoped the coming year would be even more successful than the past.

The Hon. Secretary, in supporting the vote, spoke of the hearty support he had received from the Council, and referred to the good feeling which existed amongst the members.

Major Boyd proposed a hearty vote of thanks to the Hon. Secretary, referring in cordial terms to the excellent work Mr. Thomson had done.

Dr. Waugh, in seconding the proposition, said Mr. Thomson had for years past been the backbone of the Society, and had performed his duties faithfully and well.

The motion was carried by acclamation.

Mr. Thomson briefly responded, stating that during his eight years' connection with the Society his duties had been discharged with the utmost pleasure, and that the most amicable relations had always prevailed.

A vote of thanks to the Press concluded the business portion of the proceedings.

The Royal Geographical Society of Australasia.

QUEENSLAND BRANCH.

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From September, 1891, to August, 1892.

(The names of the Donors are in *italics*).

ABSTRACT of Proceedings of the Linnean Society of New South Wales—September to December, 1891, and January to June, 1892.
From the Society.

ANNALS of the Queensland Museum. No. 2. Zoology of British New Guinea: also, Annual Report of the Trustees. *From the Trustees.*

ANNUAIRE de la Association National de Topographie. Paris: 1891.
From the Association.

ANNUAIRE Geologique Universel. Vol. VII. Nos. 2-4, 1890. Vol. VIII, No. 1, 1891. Paris. *From the Publishers.*

ANNUAL Report of the Commissioner of the General Land Office for 1891: Washington, U.S.A. *From the Commissioner.*

ANNUAL Report on British New Guinea from 1st July, 1890, to 30th June, 1891. *From his Honour Sir W. MacGregor, K.C.M.G.*

ANNUAL Report (Tenth) of the United States Geological Survey, 1888-89; Parts 1 and 2; also, U.S. Relief Map.
From the Department of the Interior, U.S.A.

ANNUAL Reports of the Department of Mines and Agriculture, New South Wales, for the years 1890-91.
From the Hon. the Minister for Mines.

ANUARIO del Observatorio Astronomico Nacional de Tacubaya para el Año de 1892. *From the Observatory.*

AUSTRALASIAN Association for the Advancement of Science—Inaugural Address by Sir Robert G. C. Hamilton, K.C.B., LL.D., Governor of Tasmania, President; 4th January, 1891. *From the Author.*

BOLETIN de la Sociedad Geografica de Lima. Nos. 2 to 12, 1891-92; also, "Petroleum in Peru, from an Industrial Point of View," by F. Moreno. *From the Society.*

BOLETIN de la Sociedad Geografica de Madrid. Tomo XXXI, Nos. 1-6; Tomo XXXII, Nos. 1-4. *From the Society.*

Boletin del Observatorio Astronómico Nacional de Tacubaya. Tomo I, Nos. 5-9. *From the Observatory.*

Boletin del Instituto Geográfico Argentino. Tomo XI, Nos. 10-12 ; Tomo XII, Nos. 1-12. *From the Institute.*

Bulletin de la Société de Géographie Commerciale de Paris. Tome XIII, Nos. 3-4, 1890-91 ; Tome XIV, Nos. 1-3, 1892. *From the Society.*

Bulletin de la Société Académique Indo-Chinoise de France. Vol. III. *From the Society.*

Bulletin de la Société Neuchateloise de Géographie. Tome VI, 1891. *From the Society.*

Bulletin de la Société de Géographie du Havre. September to October, 1891, and March to April, 1892. *From the Society.*

Bulletin de la Société Royal Belge de Géographie. Seizième année.—1892, Nos. 1 and 2. *From the Society.*

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From Wm. Soutter, Esq.

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GOLDTHWAITE'S Geographical Magazine. Vol. II, Nos. 9-12, 1891; Vol. III, Nos. 1-5, 1892. *From the Publishers.*

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HANDELSGEOGRAPHIE, IX and X, Jahresbericht, 1890-91.

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JOURNAL of the North Australian Exploration Expedition, by A. C. Gregory, 1855; McKinlay's Journal of Exploration in the Interior of Australia (Burke Relief Expedition), 1861; Landsborough's Carpentaria, 1861-62; Journal of J. G. Macdonald, on an Expedition from Port Denison to the Gulf of Carpentaria and back, 1865; Exploration Expedition: Report of Commander Norman, of H.M.C.S. "Victoria," together with Copy of his Journal on the late Expedition to the Gulf of Carpentaria, 1862; also, Report from the Engineer for Harbours and Rivers, Queensland. *From A. W. Jardine, Esq., F.R.G.S.*

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NOTES on the Geographical Knowledge of the Polynesians. By S. P. Smith, F.R.G.S. *From the Author.*

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"REMARKS on Post-Tertiary *Phascolomyidæ*;" "The Incisors of *Sceparnodon*;" "Residue of the Extinct Birds of Queensland as yet detected;" "In Confirmation of the Genus *Owenia* so-called." By C. W. De Vis, M.A. *From the Author.*

REPORT of the Third Meeting of the Australasian Association for the Advancement of Science. Vol. III. *From the Association.*

REPORTS of the Survey and Crown Lands Departments, New Zealand, for the years 1890-91.
From S. P. Smith, Esq., F.R.G.S., Surveyor-General.

REPORT of the Hydraulic Engineer on Water Supply, Queensland, 1891.
From J. B. Henderson, Esq., Government Hydraulic Engineer.

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THE National Geographic Magazine. Vol. III, pp. 205-261, 1891: Vol. IV, pp. 1-162. *From the Society.*

THE Scottish Geographical Magazine. Vol. VII. Nos. 9-12, 1891: and Vol. VIII, Nos. 1-7, 1892. *From the Society.*

TIJDSCHRIFT van het Kon. Nederlandsch Aardrijkskundig Genootschap. Tweede Serie, Deel VIII, Nos. 5-8; Deel IX, Nos. 1-4. *From the Society.*

THE Brisbane School of Arts: Report for the year 1891; also, the "*Chronicle.*" *From the Secretary.*

THE Journal of the Polynesian Society. Vol. I, Nos. 1 and 2. *From the Society.*

THE Total Eclipse of the Sun, January 1, 1889: Report of Washington University Eclipse Party. *From the Academy of Science of St. Louis.*

THE Island of Kadavu. By J. P. Thomson, F.R.S.G.S. *From the Author.*

THE Physical Geology of Magnetic Island, Queensland: Report by A. Gibbs Maitland, F.G.S. *From the Author.*

THE Queensland Horticulturist. Edited by W. Soutter. Vol. I. Nos. 1-8, 1892. *From the Editor.*

THE Surveyor. Vol. IV, 1891; and Vol. V, Parts 1-8, 1892. Also, Prize Essay on the Nature and Public Utility of Trigonometrical. General, and Cadastral Survey. By G. H. Knibbs. *From the Institution of Surveyors, New South Wales.*

THE Sydney Observatory and the *Sydney Morning Herald*: A Plea for Astronomy in New South Wales. By John Tebbutt, F.R.A.S., etc. *From the Author.*

TRANSACTIONS and Proceedings of the Royal Botanical Society of Edinburgh. Vol. XIX, June, 1891. *From the Society.*

TRANSACTIONS and Proceedings of the Geographical Society of the Pacific. Vol. II, No. 1, July 1891. *From the Society.*

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TRANSACTIONS of the Royal Society of Victoria. Vol II, Part 2. *From the Society.*

TRANSACTIONS of the Royal Geographical Society of Australasia, Victorian Branch. Vol. IX, Parts 1 and 2. *From the Society.*

TRAVELS amongst the Great Andes of the Equator. By E. Whymper. Results of the Magnetic Survey of the Colony of Victoria, executed during the years 1858-64. By G. Neumayer, Ph.D.

From the Hon. A. C. Gregory, C.M.G., M.L.C., President.

VERHANDLUNGEN der Gesellschaft fur Erdkunde zu Berlin. Band XVIII, Nos. 6-10, 1891; Band XIX, Nos. 1-5, 1892. *From the Society.*

WEATHER Charts of Australasia. Also, Summaries of Rainfall for May-December 1890, March-June 1891; and Meteorological Synopsis for July-December 1890, January-September 1891.

From the Government Meteorologist of Queensland.

GEOGRAPHICAL NOTES.

Area and Population of European Countries.—M. E. Levasseur, in a communication to the Academie des Sciences on March 21st, 1892, calls attention to the diversity usually to be found in statistics of area and population in standard works of reference. Considering only such high-class publications as *Die Bevölkerung der Erde*, the *Almanach de Gotha*, and the *Statesman's Year-Book*, he points out that diversity does not necessarily convict any of error, as the approximation to the exact figures may be arrived at in different ways; that, in fact, absolute agreement in statistics is a sign that they have been copied by one writer from another. In some cases the areas of countries are officially derived from cadastral surveys, which, as a matter of fact, often do not include the whole land and water area of a country, geographers not being agreed as to what water areas should be reckoned along with the land. In other cases official or semi-official measurements are made on large-scale topographical maps, and the degree of approximation must vary with the scale, and with the technical skill of the computer. Some countries are content with measurements or estimates made by individuals, such as those of Strelbitsky, and of Perthes' Institute. The calculation of population is still more uncertain, being dependant on census returns (themselves imperfect), calculated to any given intermediate date by estimates derived from registers of births, deaths, immigration, and emigration. In a table brought down to the end of 1890, M. Levasseur gives a conspectus of the

area, population, and density of population of the countries of Europe classed in four groups, as follows :—

	Inhabitants.	Area, sq. mile.	Density per sq. mile.
Western Europe	87,100,000	352,300	247
Central ,, ...	93,609,000	464,400	200
Southern ,, ...	71,826,000	557,800	130
Eastern ,, ...	98,000,000	2,106,500	47
Northern ,, ...	9,100,000	378,000	23
All Europe	359,635,000	3,859,200	93·1

—*Proceedings of the Royal Geographical Society, July, 1892.*

The Mean Level of the Seas of Europe.—Dr. A. Supan, in a recent number of "Petermann's Mitteilungen," calls attention to the fact that, according to the most recent measurements, particulars of which have lately been published, the old hypothesis that there were important differences in the levels of the seas of Europe is no longer tenable. The statistics given in the "Bulletin Annuel de la Commission de Météorologie du Département des Bouches-du-Rhône" (1891), show that the heights of the water at 38 stations in the Adriatic, Mediterranean, Atlantic, Channel, North Sea, and Baltic differ in most cases but a few centimetres from the height at Marseilles, so that, for practical purposes, it may be taken that the sea-level on all the coasts of Europe is the same.—*Ibid.*

Observations at Bossekop.—The close connection between the Aurora and magnetism induced Herr O. Baschin to accompany Dr. Brendel to Bossekop for the purpose of observing this phenomenon. On January first of this year they entered the Alten Fiord, at the end of which lies Bossekop. It is built on the slope of one of the raised beaches so common on the shores of the fiord and in the adjacent valleys. An elevation of the shore amounting to 43 inches is said to have taken place during the last fifty years, but the calculations are not beyond suspicion. Dr. Brendel succeeded in obtaining photographs of different forms of the Aurora, the only ones at present in existence. Violent magnetic disturbances have often been observed during displays of the Northern Lights, and the close relation of these phenomena is further demonstrated by the fact that the centres of the arcs of light lie on the magnetic meridian, and that the corona, the most splendid form of Aurora, lies in the magnetic zenith. The most remarkable disturbances took place on February 14, accompanied by an unusually gorgeous display of the Aurora, when the magnetic declination was observed to vary more than 12°—the greatest deviation ever noticed—within eight minutes. At the same time the disturbances in Europe and North America were so great that most of the self-registering instruments were unable to record them. It is not possible at present to

determine with certainty the cause of these striking phenomena, but it seems probable that the great sun-spot, seventeen times as large as the surface of the Earth, which was at the time visible even to the naked eye, was connected with the disturbances mentioned.

The meteorological observations also presented much that was interesting. The temperature on the west coast of Norway does not fall nearly so low as might be expected in such high latitudes. Even at the North Cape the mean of the coldest month is only 23° F., whereas in West Greenland on the same latitude the temperature sinks every winter to −40°. As, however, the distance from the coast increases, the temperature falls rapidly. The minimum observed at Gjesvar, near the North Cape, is −2° F.; at Bossekop, 33 miles from the open sea, −22°; and at Karasjok, further south but 120 miles from the coast, −60°. Thus the influence of the Gulf Stream, which prevents the fiords from freezing over, does not penetrate inland. The fall of snow in winter is not very large at Bossekop, but also increases towards the interior. In very cold weather the snow does not come down in flakes, but takes the form of crystals of ice, which, having no cohesion, are blown about by every puff of wind.

The Lapps may be divided into two classes—the very poor fishermen of the coast and the nomadic Lapps of the mountains, who often possess considerable property. Of late years a third class has sprung up, which has settled in two inland places, Karasjok and Kautokeino. At the beginning of March the Lapps gather to a great fair at Bossekop, where many thousand ptarmigan, several tons of reindeer flesh, besides butter and tongues, change hands. Herr Baschin drove to Karasjok in a reindeer sledge, a vehicle that requires a deal of management, in order to inspect the dwellings of the Lapps settled there. The village is situated on a stream of the same name, one of the headwaters of the Tana, the second largest river of Norway, and contains about 200 inhabitants—all, with few exceptions, Lapps. Their dwellings are conical tents, 13 to 16 feet in diameter, with openings at the top to let out the smoke from the fire in the centre. Many Lapps own 2,000 to 3,000 head of reindeer. These people are not so powerful, intelligent, and honest as the Eskimo, and give the Norwegian Government much trouble through their propensity to steal reindeer. In Karasjok Herr Baschin found Balto and Ravna, the two Lapps who accompanied Dr. Nansen on his journey across Greenland, and on his voyage home he inspected that explorer's new vessel, which is being built at Laurvig. It has a nearly semi-circular cross-section, and is rigged as a three-masted schooner. It is of 250 tons register, and is constructed almost entirely of German oak. A small engine will enable it to make six knots an hour during calms.—*Scottish Geographical Magazine, July, 1892.*

Mauritius. — In 1890 the trade of the island amounted to about £4,900,000, being £600,000 less than in former years. This diminution was due to a bad season for sugar in 1889, and a great fall in the price of that article. Mauritius produces little else but sugar, and draws its supply of cereals and flour for the support of its 360,000 inhabitants almost exclusively from India. Rice, being the principal food, is the most important article of importation: the annual consumption is fully 6,400 tons. The natives traffic also to a large extent in lentils and *dal*. The other imports comprise salt meat and fish, butter, cheese, French wines and other alcoholic liquors, oils, fruit and vegetables from Réunion, cattle and draught animals, tissues, coal, machinery, etc. The exports are sugar, rum, vanilla, and aloe fibres. Not only did the value of the sugar fall off in 1890, but the exportation of aloe fibres also decreased owing to increased supplies of sisal hemp from Florida and Yucatan. The vanilla crop also was very poor: this product is sent chiefly to France.—*Ibid.*

Greatest Depths of Oceans and Seas.—*Petermann's Mitt.*, Bd. 38, No. 2, contains the following list of the deepest soundings at present obtained and their positions:—

		Lat.	Long.	Depth in fathoms.
N. Atlantic Ocean ...	...	19° 39′ N.	66° 26′ W.	4,560
S. Atlantic Ocean ...	...	0° 11′ S.	18° 15′ W.	4,029
North Sea (Skagerack)	ca.	58° 12′ N.	9° 30′ E.	442
Baltic Sea	ca.	58° 37′ N.	18° 30′ E.	233
Mediterranean Sea ...	..	35° 45′ N.	21° 46′ E.	2,405
Black Sea	ca.	42° 55′ N.	33° 18′ E.	1,431
Caribbean Sea ...	ca.	19° 0′ N.	81° 10′ W.	3,427
Indian Ocean	..	11° 22′ S.	116° 50′ E.	3,393
N. Pacific Ocean ..	..	44° 55′ N.	152° 26′ E.	4,655
S. Pacific Ocean .	...	17° 4′ S.	172° 14′ W.	4,529
Bering Sea	...	54° 30′ N.	175° 32′ W.	2,146
Sea of Japan	ca.	38° 30′ N.	135° 0′ E.	1,640
China Sea	ca.	17° 15′ N.	118° 50′ E.	2,350
Sulu Sea	...	8° 32′ N.	121° 55′ E.	2,549
Celebes Sea	...	4° 16′ N.	124° 2′ E.	2,794
Banda Sea	...	5° 24′ S.	130° 37′ E.	2,799
Flores Sea	...	7° 43′ S.	120° 26′ E.	2,799
Arctic Ocean	..	78° 5′ N.	2° 30′ W.	2,469
Antarctic Ocean ..	...	62° 26′ S.	95° 44′ E.	1,975

—*Ibid, May*, 1892.

The London Branch of the Royal Scottish Geographical Society was successfully inaugurated at 20, Hanover Square, on the 4th April, 1892. The Marquis of Lothian, K.T., Vice-president of the Society and Chairman of the London Branch, presided. Among the large attendance

of representative guests who honoured the Society on the occasion were the presidents and officers of the leading scientific societies in London, the Agents-General for the Colonies, and a number of public officials. The Scottish office was represented by the Chairman (the Secretary for Scotland), and Mr. Wm. C. Dunbar, C.B. (the Assistant Under-Secretary). Mr. James Bryce, LL.D., M.P., delivered the inaugural address, entitled, "The Migrations of the Races of Men, considered Historically."

Liverpool Geographical Society.—This Society, which will devote itself chiefly to commercial geography, was established in December, 1891. The Right Hon. the Earl of Derby was elected President, and Mr. George A. Craig, who for some years held the position of Assistant Librarian to the Royal Scottish Geographical Society, was appointed Secretary. Some seven or eight hundred gentlemen have pledged themselves to support the Society.

Polynesian Society.—This organisation "is formed to promote the study of the anthropology, ethnology, philology, history, and antiquities of the Polynesian races, by the publication of an official journal, to be called 'The Journal of the Polynesian Society'; and by the collection of books, manuscripts, photographs, relics, and other illustrations." "The term 'Polynesia' is intended to include Australia, New Zealand, Melanesia, Micronesia, and Malaysia, as well as Polynesia proper." Her Majesty Liliuokalani, Queen of Hawaii, is Patron; His Honour H. G. Seth-Smith, M.A., President; Ed. Tregar, F.R.G.S., and our Hon. Corresponding Member, S. Percy Smith, F.R.G.S., Joint Hon. Secretaries and Treasurers and Editors of the Journal of the Society. The headquarters of the Society are at Wellington, N.Z.

The Geographical Congress, convoked by the Italian Geographical Society to celebrate the Fourth Centenary of the Discovery of America by Columbus, will be held at Genoa from the 18th to 25th September, 1892. The Council has appointed our Hon. Corresponding Members, Dr. Hugh Robert Mill and Charles Gauthiot, to represent the Society at the Congress. To celebrate the same event there will also be two Congresses held in Spain, in October next. One of these is under the auspices of the Geographical Society of Madrid, and will be held in Madrid; the other is the Ninth International Congress of Americanists, to be held at the Convent of Santa Maria de la Rabida, near Huelva.

The Sixth International Geological Congress will be held at Zurich, Switzerland, in 1894.

The next International Geographical Congress will be held in London in 1895, under the auspices of the Royal Geographical Society.

Watson, Ferguson & Co., Printers, Brisbane.

PROCEEDINGS AND TRANSACTIONS

OF THE

Queensland Branch

OF THE

ROYAL GEOGRAPHICAL SOCIETY

OF

AUSTRALASIA.

8th SESSION,
1892-93.

EDITED UNDER THE AUTHORITY OF THE COUNCIL OF THE SOCIETY
BY
J. P. THOMSON, F.R.S.G.S., ETC., ETC.,
Honorary Secretary;
Honorary Corresponding Member of the Sociétié de Géographie Commerciale de Paris, the Société de Géographie de Marseille, the Royal Scottish Geographical Society, the Manchester Geographical Society, and of the Sociedad Cientifica "Antonio Alzate," Mexico.

The Authors of Papers are alone responsible for the opinions expressed therein.

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1893.

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VOL. VIII.

Royal Geographical Society of Australasia.

QUEENSLAND BRANCH.

THIS Queensland Branch of the Society has been established for the past eight years. The Society was established with branches in New South Wales, Victoria, South Australia and Queensland, with the view of promoting the interests of Geographical Science, of encouraging exploration in Australasia, and of furthering the study of Physical and Commercial Geography.

While these objects cannot fail to commend themselves to the scientific and commercial classes of the community, and to many persons engaged in extending pastoral and mining enterprise into distant parts of the Continent, of which comparatively little is known, the great educational advantages to be derived from the establishment of this Society will be no less apparent to all intelligent colonists.

Any lady or gentleman may become an Ordinary Member, subject to election.

Entrance Fee, £1 1s. Subscription, £1 1s. per annum, due on the 1st July in each year.

The entrance fee and first year's subscription are payable after election.

Life Membership, £10 10s.

Members' Privileges.

To receive the Society's Diploma.

The right to be present at, and to introduce two friends to, all meetings of the Society.

The privileges of admission to the meetings of the Royal Geographical Society of London, and of the use, for the purpose of reference, of the Map Room and Library.

To be allowed to purchase copies of all the publications of the Royal Geographical Society of London on the same terms as the Fellows of that Society pay for extra copies.

Membership of the Royal Scottish Geographical Society when in North Britain without payment of additional fee, and the privilege of purchasing *The Scottish Geographical Magazine* on the same terms as Members of that Society pay for extra copies.

Entrée to the Evening Meetings, Library, etc., of the Sydney, Melbourne, and Adelaide Branches of the Society.

To have access to the Library and other public rooms of the Society.

To receive a copy of the Society's official publications as issued by the various Branches.

Candidates for admission as Members of the Society must be nominated by two Ordinary Members. Copies of the "Constitution and Rules" and Nomination Forms may be had on application to the Honorary Secretary, Brisbane, Queensland, to whom all communications to the Society should be addressed.

SUGGESTION.

Every person desirous of bequeathing to the Society any money is requested to make use of the following

FORM OF BEQUEST.

I give and bequeath to the Honorary Treasurer, for the time being, of the QUEENSLAND BRANCH OF THE ROYAL GEOGRAPHICAL SOCIETY OF AUSTRALASIA, *the sum of* ....

....*for the benefit of the said branch of the Royal Geographical Society of Australasia, to be expended as the Council of the said Society may deem expedient for the promotion of Geographical Science or the purpose of exploration in Australasia.*

NOTE—*The Geographical Journal* is published monthly by the Royal Geographical Society of London; price, 1s. 6d. per copy to Members of the Queensland Branch of the Royal Geographical Society of Australasia. The prices of Supplementary Papers and other publications of the former Society may be obtained on application.

The Scottish Geographical Magazine is published monthly by the Royal Scottish Geographical Society; price, 1s. per copy to Members of the Queensland Branch of the Royal Geographical Society of Australasia.

FIRST ORDINARY MEETING.

Eighth Session.

The first ordinary monthly meeting of the eighth session of the Royal Geographical Society of Australasia, Queensland Branch, was held in the Museum Library, Brisbane, on the evening of Friday, August 26, 1892. The Vice-President, Mr. R. Gailey, J.P., occupied the chair.

Mr. William Soutter read a paper on "The Speculative Cause of the Apparent Degeneration of the Australian Blacks." After a few introductory remarks, Mr. Soutter said that the condition of the black race of Australia was first introduced to the Society by the Hon. A. C. Gregory, in his annual address delivered last month. In reply to a question, Mr. Gregory said that "our aborigines have no tradition, little conception of time or quantities, and no fixed habitation." Australia occupies the unique position of being the only known continent possessing no remains of man's constructive skill, beyond a few stone weapons and unimportant rock carvings. America, on the other hand, reveals the condition of prehistoric times by its ancient monumental records of the constructive art of its people, as exhibited by the enormous ruins scattered over the face of the country. Judging by the nature of the American continent it appeared that the disastrous ruins have been caused by volcanic disturbances, causing thousands of human beings to perish. Possibly these widespread upheavals extended to Australia, making themselves felt in both continents simultaneously. No doubt our Great Equatorial Stony Desert was at one time covered by water, perhaps in the character of an inland lake, upon the shores of which our imagination may picture thriving towns and cities, surrounded by hilly country. These, no doubt, were reached by the sudden and tremendous outburst of volcanic disturbance from the American continent, engulfing and utterly destroying cities, towns, and people, the comparatively level surface condition of the country being favourable to its influence. The survivors, in great fear, would flee to the surrounding districts for safety, and thus spread the news over a very wide area. We

are also led to suppose the existence of a second disturbance following closely on the preceding one, in which the whole of the Downs district was involved. This would probably have the effect of changing the whole of the southern portion of the continent. After this came a great general upheaval and subsidence northward, separating Borneo, New Guinea, and all adjacent islands from the now mainland of Australia. At this time it is reasonable to suppose that very few inhabitants were left on the continental plateau, and probably they would only be scattered over the coastal uplands, the central areas being barren wastes of volcanic-riven country. Under these physical conditions it is possible to account for the low social status of our native race. All their traditions would probably be swept away, with no feeling of security to bind them to one spot; weak with fear and discouraged by aimless wanderings, their food poor and scanty, it would not take many centuries of these conditions to reduce them to their present wretched state. Their food supply would be limited, and their intellect would become feeble by constant dread of nature's forces, which would also deprive them of thought, words, and memory, so that their knowledge of quantities would grow indistinct, their measurement of time a period gauged by suffering; a lifetime would contain all their shattered intelligence could grasp, and the early life of their forefathers would be a forgotten history.

The Hon. Secretary thought the members might compliment Mr. Soutter upon the elaborate nature of his speculations concerning the apparent cause of the decadence of the blacks of Australia. Whether or not these speculations were sufficient to account for the present condition of the aborigines he was not prepared to express an opinion. From a paper by Professor Jas. Geikie, on "The Evolution of Climate," he read an extract which went to show that in Palæozoic times nearly the whole continental plateau of Australia, New Guinea, and adjacent islands were submerged, and that during the Mesozoic period Australia, New Guinea, Borneo, Sumatra, and Java were linked to India, but were subsequently insulated before Tertiary times.

After further remarks by the Chairman, Mr. J. G. Anderson, in the course of a short but interesting speech upon the general geological changes that have occurred in Oceania, expressed an opinion that these were usually very slow, extending over a long period of time, and consequently their effect upon the Australian blacks would hardly be sufficient to support Mr. Soutter's views.

SECOND ORDINARY MEETING.

Eighth Session.

The second ordinary monthly meeting of the eighth session of the Royal Geographical Society of Australasia, Queensland Branch, was held in the Museum Library, Brisbane, on the evening of Friday, September 30, 1892. J. N. Waugh, M.D., one of the Past-Presidents of the Society, occupied the chair.

The author read the following paper:—

Reminiscences of the Chincha Islands.

By Major A. J. Boyd.

There are probably few, possibly no Europeans, who at the present day take any interest in the small group of barren, rocky islets which lie in 13 degs. 40 mins. S. lat., 76 degs. 13 mins. W. long., off the west coast of Peru, called the Chinchas; but at the time of my visit in 1861 these islands presented a scene of animation scarcely credible in these latter times.

It may be scarcely necessary to mention here that the western coast of Peru presents to view an almost arid, sandy region of plain, diversified by conical hills following each other in constant succession in the direction of the lofty chain of the Andes. It is emphatically a region of volcanoes and earthquakes; no country on the face of the earth being more subject to subterranean convulsions than Peru—not at all a comfortable reflection for those who live on board ships in Peruvian ports, as there is no telling at what moment, by some sudden upheaval, the vessel may find itself lying high and dry on a newly-risen island. Such an occurrence was said to have actually taken place in 1861 off the town of Pisco, about twenty miles distant from the Chinchas, on the mainland. There an island is said to have suddenly risen from the sea, and, strange to say, it was found to be covered with guano to a depth of three feet. On the following day no trace of the island was to be found, and the lead showed a depth of ninety fathoms at the spot whence it had disappeared. The arid nature of the western coast of Peru is the natural result of its

position with regard to the Andes. That stupendous chain prevents the moisture-laden easterly winds from passing to the westward of the South American continent for a distance of about 1,500 miles. The consequence is, that after distributing its munificent moisture over the valley of the Amazon, covering it with dense forests and luxuriant tropical verdure, the last remaining moisture dissolves on the eastern slopes of the towering range in deluging rains and violent storms of thunder and lightning ; whilst on the western side of the range no rain whatever falls except high up on the mountain sides, and moisture only appears on the low lands in the form of dense soaking mists (*garua*). The winds descend upon this portion of the South American continent deprived of all moisture. Rain never falls, thunder and lightning are unknown, and the climate, though warm in summer, rarely reaches a maximum of 85 degs. F., whilst in winter, which commences in August, the minimum is seldom less than 60 degs. F.

Peru owes to this absence of moisture in the atmosphere one of her most valuable commercial products—*guano*. This is really a corruption of the word *huano*, a Peruvian word signifying dung. The value of guano as a manure was appreciated by the aboriginal inhabitants of Peru long before its fertilizing properties were known to civilised nations. But the Peruvians were so alive to the importance of this product that we are told death was the punishment of any person who killed a sea-bird, whose excrements and decomposed remains formed the substance known as guano.

The chemical composition of guano has led many persons to the belief that it is a natural product, but it seems much more reasonable to conclude that it is simply the result of the congregation for ages past of myriads of sea-fowl, whose droppings, together with the desiccated remains of their bodies and remnants of their fish prey, have become dried by the sun, and as there is no rain to wash out the soluble salts contained therein, the accumulated deposits have retained all their valuable plant food.

In cold, rainy countries guano deposits are never found to any extent, but in other countries besides Peru, large deposits exist.

Australia possesses guano deposits in dry caves, which are presumably the result of the gregarious habits of the flying-fox. Tens of thousands of these fructivorous bats are often found hanging in dense clusters to the walls and roofs of caves and to the branches of trees in dark secluded parts of the ranges of Queensland, and the floors of such caves are often found covered to a considerable depth with the valuable guano.

To return to the Chinchas. Of these there are three principal islands, which I saw being worked for guano, viz., the North, Middle, and South islands. These rocky islets, which are of volcanic formation, principally granite, are about 100 feet in height, and in 1861 were covered with a solid layer of guano over 100 feet thick. The North Island (Isla del Norti) had then a population of some 3,000 persons, consisting entirely of Government officials, traders, soldiers, convicts and others interested in the guano trade. The houses were of the very flimsiest description, as no provision had to be made for rain and storms. A wooden pier ran out for some distance for the convenience of the multifarious boats and barges which were constantly plying between the ships and the shore. Harbour there was none; the vessels lay quite securely anchored in the deep water of the ever-calm Pacific, and only on very rare occasions was the surface of the sea sufficiently ruffled to prevent the deeply-laden barges sweeping off with their odoriferous cargoes to the ships.

All vessels going to the Chinchas for a cargo had to report themselves at Callao, the port of Lima. Callao lies at the mouth of the Callao River, and is a straggling town of about 20,000 inhabitants. It has frequently been damaged by earthquakes and tidal waves, and the present town is washed by the waves which long ago (1746) submerged the greater part of what is known as "Old Callao." Here there are forts and conveniences for docking large vessels. The floating dock at the time I am writing of was capable of taking up a vessel 200 feet long of 2,000 tons burthen.

The existence of numerous springs containing sulphuretted hydrogen is shown by the ceaseless bubbling up of the water—probably from the interior of some extinct submarine crater.

The Mole at Callao was a scene of great confusion at times. The harbour was crowded with merchant vessels of all nationalities, whilst almost every maritime nation under the sun was represented by one or more war vessels, whose large boats driven by sixteen oars dashed recklessly in amongst the crowd of native and foreign merchant boats, giving rise to choice language vociferated in a Babel of strange tongues. In all directions might be seen scores of Chinese coolies who were imported from Macao to work on the guano islands.

As soon as a ship had entered at the Customs she was surveyed, and, whether staunch and tight or not she had to be thoroughly caulked—we used wooden sailing vessels in those days; a red mark was then put on her sides by the Peruvian authorities, showing to what depth she might be loaded. This was a rather necessary precaution, as vessels used to load down to such a depth that a lady might have stepped with little exertion from a boat on to the main deck of a 1,000-ton ship, and this in the face of a voyage round the Horn, and with the possibility of encountering a Pampero off the Rio de la Plata! Everything being satisfactorily arranged, and supplies taken on board, the vessel was allowed to sail for the Chinchas; and a dreary trip it was—beating the whole ninety or 100 miles in the teeth of the wind! However, the time not spent in boxing the yards about was well employed in getting all things ready for taking the expected cargo on board. Baskets were fitted with slings, the boats were put in order, and all articles not required during the long spell at the islands were stowed away. At length the islands are sighted and our ship lets go anchor in the berth already allotted to her, and brings to in a peaceable manner. There used to be a law that no vessels were to discharge their ballast into the harbour, if the open roadstead can be called a harbour. This regulation was doubtless meant to prevent the filling-up of the anchorage by the millions of tons of sand, gravel, and stone which would be thrown overboard by the vast fleet of vessels, which were daily arriving in ballast. How the Peruvians could imagine that any number of vessels could fill up a depth of ninety to 100 fathoms of the Pacific Ocean to the shoaling point I cannot say, but what I do know is that every ship merrily

tumbled its ballast into the sea day after day till the hold was clear, and nobody seemed to be a bit the wiser. We got our stone ballast over the side very soon, and then had the pleasure of killing time for ninety days before we began to take in cargo. Every vessel proceeding to the islands must take its turn at being loaded, and as hundreds were there all loading at once, it is evident that some allowance must be given to a ship in her charter-party for enforced idleness and delay. This allowance, called "laying days," amounted to ninety in our case. However, the weather was glorious and amusements plentiful. The seas here are alive with mackerel. This fish is a lover of cold water and the necessary cooling stream is supplied by the Peruvian current which carries the cold waters from the Antarctic Ocean to assist in forming the great equatorial current of the Pacific. The mackerel appear at times to cover the surface of the water, and they may be caught by "jigging"—that is, throwing amongst them a line to which is attached a piece of lead melted on to three large hooks, and then dragging it forcibly forward. A piece of red rag is equally efficacious, as the fish are always ravenous. These mackerel form the staple food of the seals and sea-lions, which abound in the neighbourhood of the Chinchas; and here another unfailing and exciting sport is provided for the ships' crews. Harpooning seals is a favourite Sunday amusement, and evidence is seen of the results of the sport in the number of sealskins stretched to dry in the rigging like so many oilskin coats without sleeves. The rocks on the islands are the resort of very fine rock cod, which are taken in numbers by baiting with mussels.

About twenty miles from the islands lies the town of Pisco. I should, however, put the existence of Pisco in the past tense, as I believe it and its magnificent iron jetty have been since overwhelmed by a tidal wave. A four hours' pull and we land on the mainland of South America. Pisco was a pretty little town—a sort of market garden place—where the natives succeeded in growing pumpkins, batatas, cherimoyas, and green feed for mules—all of which were brought over in market boats to the islands and disposed of to the ships in harbour. There was considerable difficulty in landing at the pier owing to the tremen-

dous rollers which swept at intervals over the structure. The method adopted for landing at the stairs was this: a buoy was securely moored at some distance from the pier; from this a chain ran to a ring at the steps. The boat held on to the buoy until the heaviest roller had passed, then hand-over-hand she was hauled to the pier; those who were to land jumped out, hurried up the steps, and betook themselves as fast as possible to one of the shelters provided; the boat, meanwhile, hauled back at once to the buoy. As soon as the roller had left the pier the passengers hurried on to the next shelter, and finally reached the end of the journey. Some sport was to be got among the hills here in the way of shooting bald-headed eagles. What struck me at first as strange was that at the islands very few sea-birds were visible. I had expected to see them in vast numbers, but the presence of so many vessels and the crowd of people at work on all the islands had probably scared them from their usual haunts. Another peculiarity was the absence of sharks. Hundreds of men regularly bathed from the ships and no instance was known of a man being taken—in fact, I do not remember that we ever saw a shark there.

At last the time arrived when we were to commence taking in our cargo. Two or three large barges were swept out to us containing guano in bags. The whole of our lower tier was stowed, bagged, and the pumps were protected by boarding from contact with loose guano—a very necessary precaution. Guano is very dead weight to carry and strains a ship greatly. Should any serious leak occur, the guano mixing with the water would form a pasty mass which would soon choke the pumps and place the vessel in great danger. As soon as the lower tier is packed, the guano is stacked loose. The trimmers in the hold have then a bad time of it, for the hold is thick with dust—biting, pungent, ammonia dust—which searches out the eyes, nose and lungs, and often at first causes profuse bleeding at the nose. The men cover their mouths and nostrils with a handkerchief rolled round a wad of oakum as some protection against the annoyance. Quantities of carbonate of ammonia are picked out of the loose guano, and often large lumps of snowy whiteness are discovered by the convict workers, and secreted by them until a favourable opportunity occurs for exchanging them for pieces of ship's pork.

Although guano appears in the home markets as a loose powder, it lies very solid in its natural bed, and often has to be blasted out. The method of working is to start a row of men at the foot of the guano bed. Each has a certain breadth to break out and he works upwards, leaving a little wall of demarcation between himself and his neighbour. The guano, as it rolls down, is loaded into waggons which run on rails along the top of the rock to the end of a shoot, where it is tipped into the barges lying beneath. Smaller vessels lie under the cliffs and their cargoes are at once shot into them down canvas shoots. It is said that occasionally a Chinaman, tired of his life and despairing of ever seeing Macao again, comes down the shoot head first amongst the guano. It may be so, but it must be an unpleasant method of suicide. Once the ship has begun to load, the work goes on with little intermission until the cargo is complete. The guano in the upper hold is trimmed neatly into a pyramidal shape, the hatches are securely battened down, and active preparations are made for departure. Sails are bent, chafing gear put on, decks are holystoned and washed down, brass work cleaned, and a grand party is often given on board as a farewell. On the day of sailing, boats are sent from nearly every ship in port to escort the happy homeward-bound crew for a few miles. Then when the ensign dips its farewell, an exciting race begins amongst the escorting boats back to their respective vessels. There is an impression that guano is an unpleasant, unsavoury cargo, but it is erroneous. No unpleasantness is experienced on the home voyage. The guano settles down into a compact mass, and only by a slight and not unpleasant smell of ammonia can its presence be detected.

The first person to make known the value of guano as a fertilizer was Baron Von Humboldt, who brought home specimens of it in 1804. Its commercial value depends, amongst other things, upon the amount of decomposition to which it has been subjected, and to its not having lost any of its volatile salts by the agency of the atmosphere, of rain, or of sea-water. The poorest guano is that which has parted with most of its ammonia and contains little more than the earthy phosphates of the alluvial deposits mixed with sand. The proportion of ammonia per cent varies in

guano from 7·3 to 1·47%, and its agricultural value depends upon the quantities of ammonia, soluble and insoluble phosphates, and alkaline salts which it contains. One ton of good Peruvian guano is equal to 33½ tons of farmyard manure. The greatest quantity ever imported into England was in 1870, when 280,311 tons left the islands for Great Britain. It was first exported in 1832, and in 1853 a survey by the Peruvian Government showed that 12,376,100 tons were available on the Chinchas. In 1872 foreign export was closed. The islands were seized by the Spanish admiral Pinzon in 1864 to compel the Peruvian Government to apologise and make amends for their ill-treatment of immigrants from Biscay. The profits made by the importers of guano at this time must have been very great. I do not profess at this distant date to be precise in my figures, but I think that the amount paid to the Peruvian Government was £1 10s. per ton and freight home from £1 10s. to £2, and as it was usually greatly adulterated with earthy matter and was sold at from £15 to £20 per ton, there seems to be reason to expect that some slight margin of profit remained to the importer.

What the appearance of the Chinchas may be now I cannot say, but probably the mine is worked out, as I find that in 1873 only 11,634 tons were obtained, and 1874 the population of the North Island had dwindled to 105.

The run back to Callao is very quickly performed, as the trade winds blowing from the south-east are fair for the northward passage. The view on approaching the coast from the sea is very fine. In the background rises the Great Cordillera of the Andes, with its innumerable peaks—regions of perpetual snow, avalanches, and volcanic eruptions. To the west of the great range rises a series of innumerable conical hills, dry and barren, whilst closer to the coast the country is more fertile, and groves of orange-trees, pretty gardens, and well-cultivated patches are everywhere to be seen. A lighthouse on Cape San Lorenzo enables vessels to approach the port in safety at all times.

From Callao a line of railway runs to Lima, the capital city, distant about six miles. Of course I did not omit the opportunity of running up to view this—one of the finest cities in

South America. This is not the place to give a description of the city founded by Pizarro in 1535, after his cruel subjugation of the Incas. Suffice it to say that it presents an imposing appearance owing to the existence of magnificent squares, and beautiful public buildings flanking the Grand Square—an open space containing about fifteen acres. Elsewhere, however, the magnificence is detracted from by the small altitude of the houses which are very low. This style of architecture has been forced upon the people of Lima owing to the frequent occurrence of earthquakes from which it has suffered severely at intervals of about ten years.

They have a remarkable system of drainage in Lima which might be with ease and advantage adopted in our Australian cities. The water from the river is allowed to flow in covered tunnels through the streets, thus keeping the thoroughfares, drains, and houses in a constantly clean and healthy state. As there is plenty of water so there are numerous gardens, and the surrounding country presents a picture of great fertility in spite of the absence of rain. As a rule we who live in countries favoured with regular showers do not sufficiently appreciate the pleasure of a good downpour after a rather dry season ; but during the six months of my sojourn on the Peruvian coast nothing would have given me greater pleasure than to have experienced a mild thunderstorm followed by the familiar pattering of the heavy raindrops. But this we experienced *ad nauseum* long before we crossed the Equator on the western side of the continent on our homeward voyage, which need not here be described. I was satisfied that I had seen the Chincha Islands and the guano workings in the heyday of their prosperity, but i I were now asked to spend another six months at these desolate rocks, I do not think I would accept the invitation with any alacrity.

The Hon. Secretary thought that Major Boyd had given a very lucid and, to him, remarkably interesting description of one of the Peruvian guano-producing groups of islands. The paper was all the more interesting to him because of the fact that Peru and Chili were the scenes of his earliest wanderings abroad. The Chincha Islands were, he believed, twelve miles from the mainland, and their aggregate area about 400 acres. The first cargo of guano was shipped for England in 1840, at which time the Peruvian Gov-

ernment calculated that the deposit would last till 1880. It was well known that the islands on the Peruvian coast were remarkable for their guano deposits, the island of Lobos de Tierro, in 6 deg. 27 min. south latitude, being the largest guano-producing island in the world. The climate and general aspects of Peru had, at the time of his visit, left a very favourable and lasting impression upon him; almost every variety of scenery could be viewed from its surf-bound shores of the Pacific to the lofty heights of the Andes. Travelling by rail, although in places slow, was rendered attractive by the fact that lofty heights could be reached in comfort by the Oroya Railway, which attains the unparalleled elevation of 15,645 ft. Earthquakes and tidal waves were great enemies to the country and its people, and it was no uncommon thing to see the finest monuments of man's constructive skill dashed to the ground by an earthquake, or scattered to the four winds of the heavens by an immense tidal wave in a single moment. When he (Mr. Thomson) landed at the seaport town of Arica he was astonished when his travelling companion conducted him to the bed of a dry creek some distance from the seashore, and pointed out to him the remains of an old American gunboat, wedged between two rocks in the bottom of the valley, that marked the limit of one of the tidal waves, that had swept the vessel from her anchorage in the open roadstead and placed her on *terra firma*. The surf was sometimes a drawback to shipping, as also the labourers employed at the ports, who believed from religious considerations in two holidays a week. Marine fauna was plentiful in the shape of mackerel, seals, sea-lions, rock cod, &c. He had never in any part of the world, not even on the coast of Scotland, seen so many mackerel as in Peruvian waters, and he was glad that Major Boyd had made special reference to that fact. He was sure the meeting had much appreciated the paper by Major Boyd, and would thank him for it.

After some interesting remarks by the Chairman and other members, the meeting closed.

THIRD ORDINARY MEETING.

Eighth Session.

The third ordinary monthly meeting of the eighth session of the Royal Geographical Society of Australasia, Queensland Branch, was held in the Museum Library, Brisbane, on the evening of Friday, October 28, 1892. The Vice-President, Mr. R. Gailey, J.P., occupied the chair.

The Hon. Secretary read a part of a paper on the "Geographical Development of Coast Lines," being the presidential address of Professor James Geikie, LL.D., D.C.L., &c., to the Geographical Section of the British Association for the Advancement of Science at its meeting held at Edinburgh in August, 1892.

FOURTH ORDINARY MEETING.

Eighth Session.

The fourth ordinary monthly meeting of the eighth session of the Royal Geographical Society of Australasia, Queensland Branch, was held in the Museum Library, Brisbane, on the evening of Friday, December 16, 1892. J. N. Waugh, M.D., one of the Past-Presidents of the Society, occupied the chair.

Elections.—Ordinary Members: Messrs. H. E. Aldridge, J. Anning, W. M. Bonar, J. A. Foot, J. A. Hayes, K. Kemnitzer, and W. A. S. Mills,

The meeting devoted an hour to the discussion of the second part of Professor James Geikie's address on the "Geographical Development of Coast Lines," of which the following is an abstract, reproduced from the "Bulletin of the American Geographical Society," Vol. XXIV, No. 3, 1892:—

After reviewing the successive theories advanced by Celsius, who, from an examination of the coast lands of Sweden, attributed the retreat of the sea to a gradual drying up of the latter; by Playfair, who thought it much more likely that the land had risen, and whose theory was supported by Von Buch

and Lyell; by Trautschold and others, who maintained that the sea-level may have changed without reference to movements of the lithosphere; by Hilber, who suggested that sinking of the sea-level may be due, in part at least, to absorption; by Schmick, who believed that the apparent elevation and depression of continental areas was really the result of grand secular movements of the ocean; by Professor Suess, who, believing that in equatorial regions the sea is, upon the whole, gaining on the land, while in other latitudes the reverse would appear to be the case, points out that this is in harmony with his view of a periodical flux and reflux of the ocean between the equator and the poles; the President said that, apart from all hypothesis and theory, we learned that the surface of the sea is not exactly spheroidal. It reaches a higher level on the borders of the continents than in midocean, and it varies likewise in height at different places on the same coast. The attraction of the Himalaya, for example, suffices to cause a difference of 300 ft. between the level of the sea at the delta of the Indus and on the coast of Ceylon. Geographers, however, must for the present be content to take the world as they find it. What we do know is that our lands are distributed over the surface of a great continental plateau of irregular form, the bounding slopes of which plunge down more or less steeply into a vast oceanic depression. So far as geological research has gone, there is reason to believe that these elevated and depressed areas are of primeval antiquity —that they antedate the very oldest of the sedimentary formations. There is abundant evidence, however, to show that the relatively elevated or continental area has been again and again irregularly submerged under tolerably deep and wide seas. But all historical geology assures us that the continental plateau and the oceanic hollows had never changed places, although from time to time portions of the latter have been ridged up and added to the margins of the former, while ever and anon marginal portions of the plateau have sunk down to very considerable depths. We may thus speak of the great world-ridges as regions of dominant elevation, and of the profound oceanic troughs as areas of more or less persistent depression. From one point of view, it is true, no part of the earth's surface can be looked upon as a region of dominant elevation. Our globe is a cooling and contracting body, and depression must always be the prevailing movement of the lithosphere. The elevation of the continental plateau is thus only relative. Although it is true that the land surface is nowhere co-extensive with the great plateau, yet the existing coast-lines may be said to trend in the same general direction as its margins. So abruptly does the continental plateau rise from the oceanic trough that a depression of the sea level, or an elevation of the plateau, for 10,000 ft., would add only a narrow belt to the Pacific Coast between Alaska and Cape Horn, while the gain of land on the Atlantic slope of America between 30° N.L. and 40° S.L. would not be much greater. In the higher latitudes of the Northern Hemisphere, however, very considerable geographical changes would be accomplished by a much less amount of elevation of the plateau. Were the continental plateau to be upheaved for 3,000 ft. the major portion of the Arctic Sea would become land. Thus, in

general terms, we may say that the coast-lines of Arctic and temperate North America and Eurasia are further withdrawn from the edge of the continental plateau than those of lower latitudes. In the geographical development of our land, movements of elevation and depression have played an important part. But we cannot ignore the work done by other agents of change. If the orographical features of the land everywhere attest the potency of plutonic agents, they no less forcibly assure us that the inequalities of surface resulting from such movement are universally modified by denudation and sedimentation. Elevated plains and mountains are gradually demolished, and the hollows and depressions of the great continental plateau become slowly filled with their detritus. Thus inland seas tend to vanish, inlets and estuaries are silted up, and the land in places advances seaward. The energies of the sea, again, come in to aid those of rain and rivers, so that under the combined action of all the superficial agents of change the irregularities of coast-lines become reduced, and, were no crustal movement to intervene, would eventually disappear. To sum up, then, we may say that the chief agents concerned in the development of coast-lines are crustal movements, sedimentation, and marine erosion. All the main trends are the result of elevation and depression. Considerable geographical changes, however, have been brought about by the silting up of those shallow and sheltered seas which, in certain regions, overflow wide areas of the continental plateau. Throughout all the ages, indeed, epigene agents have striven to reduce the superficial inequalities of that plateau, by levelling heights and filling up depressions, and thus, as it were, flattening out the land surface and causing it to extend. The erosive action of the sea, from our present point of view, is of comparatively little importance. It merely adds a few finishing touches to the work performed by the other agents of change. After a short account of the geographical evolution of Europe ; of North America, in which, he said, there seems little doubt that land connexion obtained between Greenland and Europe in Cainozoic times, along the broad ridge upon which the Færöe Islands and Iceland are founded, for relics of the same Tertiary flora are found in Scotland, the Færöe Islands, Iceland, and Greenland ; of the Gulf of Mexico and the Carribean Sea, which have frequently been compared to the Mediterranean, so that one may say the Mexican-Carribean Sea and the Mediterranean are rather homologous than simply analogous ; of the Atlantic coasts of Africa and South America which presented some points of resemblance and some of contrast with each other ; and of the coast-lines of the Pacific Ocean, the Asiatic coasts of which offer a strong contrast to those of the American borders, and in which an elevation of land for 6,000 ft. or 7,000 ft. in the seas surrounding the great chain of islands from Kamchatka to the Philippines and New Guinea would enclose those seas by continuous land, so that all the principal islands of the East Indian Archipelago—Sumatra, Java, Celebes, and New Guinea, would become united to themselves as well as to Australia and New Zealand ; Professor Geikie summed up as follows :—In fine, then, we arrive at the general conclusion that the coast-lines of the globe are of very unequal

age. Those of the Atlantic were determined as far back as Palæozoic times by great mountain uplifts along the margin of the continental plateau. Since the close of that period many crustal oscillations have taken place, but no grand mountain ranges have again been ridged up on the Atlantic seaboard. Meanwhile the Palæozoic mountain-chains, as we have seen, have suffered extensive denudation, have been planed down to the sea-level, and even submerged. Subsequently converted into land, wholly or partially as the case may have been, they now present the appearance of plains and plateaus of erosion. often deeply indented by the sea. No true mountains of elevation are met with anywhere in the coast-lands of the Atlantic, while volcanic action has well-nigh ceased. In short, the Atlantic margins have reached a stage of comparative stability. The trough itself, however, is traversed by at least two well marked banks of upheaval—the great meridional Dolphin Ridge, and the approximately transmeridional Færöe-Icelandic belt—both of them bearing volcanic islands. But while the coast-lands of the Atlantic proper attained relative stability at an early period, those of the Mediterranean and Carribean depressions have up to recent times been the scenes of great crustal disturbance. Gigantic mountain-chains were uplifted along their margins at so late a period as the Tertiary, and their shores still witness volcanic activity. It is upon the margins and within the troughs of the Pacific Ocean, however, that subterranean action is now most remarkably developed. The coast-lines of that great basin are everywhere formed of grand uplifts and volcanic ranges, which, broadly speaking, are comparable in age to those of the Mediterranean and Caribbean depressions. Along the north-east margin of the Indian Ocean the coast-lines resemble those of the Pacific, being of like recent age, and similarly marked by the presence of numerous volcanoes. The northern and western shores, however (as in Hindostan, Arabia, and East Africa), have been determined rather by regional elevation or by subsidence of the ocean floor than by axial uplifts—the chief crustal disturbances dating back to an earlier period than those of the East Indian Archipelago. It is it keeping with this greater age of the eastern and northern coast-lands of the Indian Ocean that volcanic action is now less strongly manifested in their vicinity. I have spoken of the comparative stability of the earth's crust within the Atlantic area as being evidenced by the greater age of its coastal ranges and the declining importance of its volcanic phenomena. This relative stability is further shown by the fact that the Atlantic seaboard is not much disturbed by earthquakes. This, of course, is what might have been expected, for earthquakes are most characteristic of volcanic regions and of those areas in which mountain uplifts of recent geological age occur. Hence the coast-lands of the Pacific and the East Indies, the borders of the Caribbean Sea, the volcanic ridges of the Atlantic basin, the lands of the Mediterranean, the Black Sea, and the Aralo-Caspian depressions, the shores of the Red Sea, the vast tracts of Southern Asia, are the chief earthquake regions of the globe. It may be noted, further, that shocks are not only most frequent but most intense in the neighbourhood of the sea. They appear to originate sometimes in the volcanic

ridges and coastal ranges, sometimes under the floor of the sea itself. Now earthquakes, volcanoes, and uplifts are all expressions of the one great fundamental fact that the earth is a cooling and contracting body, and they indicate the lines of weakness along which the enormous pressures and strains induced by the subsidence of the crust upon its nucleus find relief. We cannot tell why the coast-lands of the Atlantic should have attained at so early a period a stage of relative stability—why no axial uplifts should have been developed along their margins since Palæozoic times. It may be that relief has been found in the wrinkling-up of the floor of the oceanic trough, and consequent formation of the Dolphin Ridge and other great submarine foldings of the crust. And it is possible that the growth of similar great ridges and wrinkles upon the bed of the Pacific may in like manner relieve the coast-lands of that vast ocean, and prevent the formation of younger uplifts along their borders. I have already remarked that two kinds of elevatory movements of the crust are recognised by geologists—namely, axial and regional uplifts. Some, however, are beginning to doubt, with Professor Suess, whether any vast regional uplifts are possible. Yet the view that would attribute all such apparent elevations of the land to subsidence of the crust under the great oceanic troughs is not without its difficulties. Former sea-margins of very recent geological age occur in all latitudes, and if we are to explain these by sub-oceanic depression, this will compel us to admit, as Suess has remarked, a general lowering of the sea-level of upwards of 1,000 feet. But it is difficult to believe that the sea-floor could have subsided to such an extent in recent times. Suess thinks it is much more probable that the high-level beaches of tropical regions are not comtemporaneous with those of higher latitudes, and that the phenomena are best explained by his hypothesis of a secular movement of the ocean—the water being, as he contends, alternately heaped up at the equator and the poles. The strand-lines in high latitudes, however, are certainly connected with glaciation in some way not yet understood. And if it cannot be confidently affirmed that they indicate regional movements of the land, the evidence, nevertheless, seems to point in that direction. In concluding this imperfect outline-sketch of a large subject, I ought perhaps to apologise for having trespassed so much upon the domains of geology. But in doing so I have only followed the exanple of geologists themselves, whose divagations in territories adjoining their own are naturally not infrequent. From much that I have said it will be gathered that with regard to the causes of many coastal changes we are still groping in the dark. It seems not unlikely, however, that as light increases we may be compelled to modify the view that all oscillations of the sea-level are due to movements of the lithosphere alone. That is a very heretical suggestion ; but that a great deal can be said for it any one will admit after a candid persual of Suess's monumental work, "Das Antilitz der Erde."

FIFTH ORDINARY MEETING.

Eighth Session.

The fifth ordinary monthly meeting of the eighth session of the Royal Geographical Society of Australasia, Queensland Branch, was held in the Museum Library, Brisbane, on the evening of Thursday, April 13, 1893. Major A. J. Boyd occupied the chair.

The author read the following paper :—

The "Melanesian Plateau :" Notes on Mr. C. Hedley's paper.

By J. P. Thomson, F.R.S.G.S., Etc.

Hon. Secretary to the Royal Geographical Society of Australasia, Brisbane.

In a paper contributed to the Linnean Society of New South Wales,* Mr. Charles Hedley, F.L.S., of the Australian Museum, introduces to the world of knowledge an interesting and geographical subject regarding the early continental character of what are now insulated areas, extending over a rather wide range of the South Pacific Ocean. This extensive plateau embraces within its geographic limits the archipelagoes now known as the New Hebrides, Fiji, Solomon, Loyalty, New Zealand, and the islands of New Caledonia, Norfolk, and Lord Howe. The assumption that these are fragments of a disintegrated continent, now connected only by comparatively shallow and submerged depressions, of probably great antiquity, is based upon the geographical distribution of the land molluscan fauna, more particularly upon the genus *Placostylus*. Representatives of this class are distributed over an area bounded on the north by the Solomons, on the east by Fiji, on the south by New Zealand, and on the west by Lord Howe Island. This, it will be noted, lies within the volcanic subregion extending from the Solomon Islands through the New Hebrides to New Zealand, and embrac-

* "The Range of Placostylus : A Study in Ancient Geography," by C. Hedley, F.L.S. Vol. VII (second series) of the Proceedings of the Linnean Society of New South Wales 31st August, 1892, page 335.

ing the comparatively shallow tongues stretching to New Caledonia, Fiji, and Lord Howe Island. It is this area, probably bounded by the 1,300-fathom contour-line that Mr. Hedley proposes to name the MELANESIAN PLATEAU. Although no allusion is made to the broad geographical conditions far and away outside this circumscribed region, it should be pointed out that it is to no inconsiderable extent within the influence of that enormous belt of subterranean activity extending right across the Pacific from the South American continent through the Eastern Archipelago and Sunda Islands to Madagascar, embracing amongst others the Marshall, Caroline, Gilbert, and Low groups, as well as Samoa and Tonga. These, in the writer's opinion, should also be connected with Mr. Hedley's newly-evolved plateau. We are, however, told that "eastwards of Fiji the molluscan fauna indicates the abrupt termination of the Melanesian Plateau. Between the Samoas and Fijis a sounding of 2,600 fathoms has been obtained. Significant of this is the absence of *Placostylus* from Savaii, Upolu, or Tutuila. The Samoan Islands appear as well fitted as the Fijian to nourish an extensive series of *Placostylus*. They are large, densely wooded, with a warm, moist, and equable climate. The distance from their western neighbours is no greater than from the latter to the groups to the westward, and not to be compared to the spaces between New Caledonia and Lord Howe or New Zealand, which have proved no obstacle to the spread of the genus. Yet the Samoas possess a distinctly oceanic mollusc fauna comparable to that of Tahiti, while the mollusc fauna of the Fijis is as distinctly continental."

"On the westward, we learn from the Challenger soundings that about the 20th parallel a bank of a maximum depth of 1,300 fathoms connects the Melanesian Plateau with the Great Barrier Reef, This bank was not actually plumbed, but its existence is inferred from the fact that soundings in the Coral Sea diminished in temperature down to 1,300 fathoms, and below that level to 2,450 fathoms the thermometer readings were stationary. The inrush of cold water from the Antarctic abyss is therefore stopped by banks, whose lowest depth is 1,300 fathoms, hemming in the abyss of the Coral Sea. But the canal whose floor is the 1,300-fathom level *may* lie, not between the Great Barrier Reef and New Caledonia, but at the head of the gulf between the Loyalties and the New Hebrides."

The probability of an early connection between the Australian continent and New Zealand, and, therefore, north to New Guinea, is a subject upon which several enlightened writers have dwelt. The affinity between the flora of these separate regions is not, however, in the writer's opinion, sufficient evidence of their former continental character. It is well known how the germs of plant life have been disseminated over vast oceanic and insular regions, through the medium of the great circulating currents of the ocean. Geologists on the other hand have more reasonable and adequate evidence to adduce in support of this theory than we are able to find in the distribution of plants. Professor James Geikie, in an exhaustive and very valuable paper upon the "Evolution of Climate," * points out that there is "every probability that at some later stage of the Mesozoic era a land connection obtained between New Zealand and Australia;" thus supporting the well-known naturalist Wallace, who claims to have shown that this union is sufficient to account for the predominating influence of the New Zealand flora. But here, again, we are confronted by Mr. Hedley, who contends that "this theory is totally opposed to the distribution of *Placostylus* in particular, and of the Melanesian mollusc fauna in general. Were it true, then Lord Howe, the furthest western outpost of the Melanesian Plateau, would be tenanted by forms bearing some resemblance to Queensland mollusca. Had the stream of life reached Lord Howe from the north-west instead of from the north-east, then *Placostylus* would have been replaced by *Hadra* and *Chloritis*; while *Pupina* and *Helicina* would have been substituted for *Realia* and *Omphalotropis*."

Assuming that the actual geographical limits of this plateau are substantially defined and circumscribed by the range of this genus *Placostylus*, we shall certainly require to cast about for some new theory that will adequately account for the presence of the remains of the New Zealand Moa in Queensland; bones of that remarkable wingless bird having been discovered on the Darling Downs, and identified and described by Mr. C. W. De Vis, Curator of the Queensland Museum.† The Post-Pliocene Drifts of Queensland have also yielded fragments of the remains of the

* "Scottish Geographical Magazine," vol. vi, p. 77.
† "The Moa in Australia," by C. W. De Vis, M.A.; "The New Zealand Journal of Science," May, 1891, No. 3, Vol. I. (new issue), p. 97.

Kiwi, *Metapteryx bifrons*, an extinct bird belonging to the family Apterygidæ, of New Zealand.* Here we are at once furnished with types of the avifauna of a bygone age, when continents, probably existing under entirely different climatic conditions to those which belong to the present period, possessed all the necessary requirements essential to the sustenance of a variety of both animal and vegetable life, of which the few interesting specimens we possess are but mere fragments. Thus we see the process of unconquerable nature going on from ages to ages, always active, ever silently shaping things new from an inexhaustible stock of indestructible material; new continents are evolved and so are new worlds, and this will forever continue so to be throughout eternity.

Of the islands occupied by *Placostylus*, Mr. Hedley thinks they may probably have been united, if not into one continuous whole, at least into much larger fragments with an existing union, probably temporary in character, that would enable this type of molluscan fauna to migrate from one area to another.

Should further and more extended examination show that this Melanesian Plateau is insulated by deeper gulfs than those separating it from Australia, even then, Mr. Hedley ventures to assert, the theory advanced in favour of their former union would not suffer defeat. It is the ocean's permanency which, he believes, will determine the limit of the distribution of forms of life, not the depth.

After referring to the division of the genus *Placostylus* and the difference between its northern and southern types; to the depths of the ocean between New Zealand and Fiji, New Caledonia and the New Hebrides, Mr. Hedley concludes that early in the history of the existing fauna the Melanesian Plateau was insulated, and has never since been reunited. He, moreover, reviews the evidence of affinity existing between the various forms of land mollusca, distributed over the archipelagoes of this plateau, and points out that this unmistakably shows that Fiji first derived its molluscan fauna from the Solomon Islands; that *Placostylus*, having limited its range to the zoological province of the Melanesian Plateau, other groups of islands to the eastward and scattered

* "Residue of Extinct Birds of Queensland as yet Detected," by C. W. De Vis, M.A.; Proceedings of the Linnean Society of New South Wales (second series), Vol. VI. p. 448.

over the South-east Pacific were colonised by other minute forms of molluscan life that drifted eastwards from place to place. Furthermore, he remarks that this provincial plateau derived its fauna from Papua by the way of New Britain and not from Australia, with which it never was connected; that New Guinea was the source of the genera common to Australia and New Zealand: that after their early separation New Zealand and New Caledonia ceased to receive immigrants from the Northern archipelagoes: and that Fiji "remained to a later date in communication with the Solomon Islands, but were severed from that group before the latter had acquired from Papua much of its present fauna."

The CHAIRMAN thought the meeting was very deeply indebted to Mr. Thomson for his able and exceedingly interesting paper. It was a subject which should be discussed by all scientific societies, both in Australia and elsewhere, and he was very glad Mr. Thomson had agreed to Mr. Hedley's request to take the matter up. He was of opinion that the existence of Moa bones in Australia was not sufficient evidence to support the theory of a former union between New Zealand and Australia, or between that and any other place.

Mr. W. SOUTTER did not think the distribution of plants over widely separated areas was evidence of the existence of former connection either in the case of New Zealand and Australia or other parts of the world. He agreed with what Mr. Thomson had pointed out in his paper, that germs of plant life were carried by wind and ocean currents over enormous distances from place to place.

Mr. A. GIBB MAITLAND, F.G.S., remarked that the Society owed a debt of gratitude to Mr. Thomson for introducing the subject dealt with by Mr. Hedley, not only because of the fascination attaching to the study of the distribution and origin of insular faunas and floras, but also because the consideration of the physical features of bygone periods, as well as those of the present day, come equally within the scope of a society whose aims are of a purely geographical nature. At the outset it is as well to disabuse our minds of the prevalent impression that the outlines of the masses of land shown on existing maps are the true expression of the facts of the case. These outlines give us but a very imperfect notion of the real shape of the land masses. When a bathymetrical map of a large area is studied, one is led to different conclusions as to the former connection of continents and islands from those which are obtained by purely geographical data. Little accurate knowledge is extant regarding the submarine topography of the area included within the limits of what Mr. Hedley calls the Melanesian Plateau. If a map prepared from the most reliable data, showing the bathymetrical lines of 1000,

2000, 3000 and 4000 fathoms, is examined, it will be seen that the plateau has a somewhat significant configuration. The island of New Guinea rests upon a submarine bank, bounded by the 2000-fathom line, which bank includes the islands of New Britain, the Solomon group, Santa Cruz, New Hebrides, and the Fiji archipelago. These islands are connected by an arm stretching so far to the southward as to embrace the Tonga and Kermadoc groups. This large submarine bank is separated from another upon which rest the islands of Norfolk, Lord Howe, New Zealand, Chatham, Emerald, etc., by a deep abyss of over 2000 fathoms, which heads in the Gulf of Papua. The course of the northern portion of this submarine valley agrees in its general trend with that of the Fly River, after its divergence to the eastward by the rocky islands of Torres Straits, which are merely the northward projection of the Peninsula of Cape York. In the centre of this valley, rapidly narrowing at this point, there appears a bank upon which rest New Caledonia and the Loyalty Islands. Whether this bank forms a large island in the valley or is connected by a narrow neck with the New Hebrides group, the soundings are of a too fragmentary nature to make out. From Norfolk Island northwards, after traversing an area which does not, up to the present, appear to have been plumbed, the plateau is connected with the Great Barrier Reef by numerous islets, reefs, and cays just appearing above the tidal mark—the summits, I take it, of a submerged range. What may be called the New Zealand fork of the Melanesian Plateau is separated from the continent of Australia by another deep valley, heading to somewhere north of Sandy Cape, on the Queensland coast. From these data we are enabled to trace an approximate parallelism between the mean trend of that arc which includes the Barrier Reef and the north-west end of the North Island of New Zealand, and that which may be appropriately designated as the Papua-Fijian arc. A careful study of the deep-sea soundings, says Alexander Agassiz, reveals the presence of the folds in the earth's crust, of which the continents are merely such portions as are elevated above the sea level. These continental masses have formed a nucleus, around the old outlines of which the same authority concludes the principal changes in configuration have taken place. It is not from bathymetrical data that we are able to learn whether the islands included in the plateau are mere volcanic peaks, like those of the Sandwich Islands, or are parts of larger masses of land first built up of sedimentary or deep-seated igneous rocks, and subsequently reduced by denuding agencies; it is to geology we have to look for the true solution of the problem. Our knowledge of the geology of the region in question, however, lacks that comprehensiveness which could be desired. The salient features appear to have been made out, and are amply sufficient to demonstrate the continental character of the islands. The geology of the continent of Australia is too well known to you all to require much description. Ancient sedimentary rocks, penetrated by others of igneous origin, abound, succeeded by representatives of all formations, from the Silurian to the most recent. The Tertiary period appears to have been characterised by intense volcanic activity, and, so far as our present knowledge goes, the volcanic

fires seem to have been particularly prolific in the north-eastern portion of the continent. A great similarity exists between the geology of New Guinea and the continent of Australia. A large portion of the highlands is composed of crystalline rocks, both igneous and metamorphic, and others in which the alteration has not gone on sufficiently far to conceal their clastic nature. These ancient sediments have been enveloped by a series of beds which have yielded Tertiary fossils. Wherever I had the opportunity of seeing these beds, it is a significant fact that they were either vertical or inclined at high angles. To the Tertiary beds succeed coral reef masses, which show all gradations from a few feet above the water to 2,000 ft. above the level of the sea. There is also a large development of comparatively recent volcanic rocks. That volcanic activity has not yet entirely died out is evinced by the numerous hot springs of the D'Entrecasteaux Group, and the volcano of Mount Victory, on the north-east coast. Between New Guinea and the Solomons exist numerous coral islands of which we have but little knowledge. As pointing to the fact that these coral islands—many of them raised reefs—may rest upon the summits of a submerged range, I may mention that of Egum. From this island was obtained a deep-seated igneous rock of acid composition, which I have not yet critically examined. The geology of the Solomon Group has been investigated by Dr. Guppy, and from his researches we learn that the backbone of the principal islands is made up of highly crystalline rocks, such as quartz-diorites, quartz-felsites, dolerites, serpentines, etc., formed and altered at considerable depths and indicating great geological age. Recent volcanic rocks and others of organic origin flank the lower slopes of the larger islands, and in the case of the smaller ones form the entire surface exposed above water. The researches of Hoskin, nearly two decades ago, showed that the New Hebrides consisted of volcanic and coral islands. It is not unlikely that, as in the case of the Solomons, the backbone may be of ancient crystalline rocks. We are indebted to Herteau and Levat for our knowledge of the structure of New Caledonia. Geographically it agrees with that of the islands already described. Serpentinous rocks appear to form the chief framework: on the north and north-east are crystalline schists, and "metamorphic" rocks on the west. The former writer mentions coal measures of Liassic age. Wichmann, Meinicke, and others have investigated the geology of the Fijian archipelago. From their writings we learn that, contrary to the general expressed notion, the islands are composed of plutonic rocks and crystalline schists, invested by a covering of organic and volcanic accumulations. There are sedimentary rocks which have yielded Tertiary fossils. The Tonga or Friendly Islands, so far as recent geographical investigations have been carried, appear to be built up of large volcanic and calcareous formations. There is good reason to believe that these islands rest on a base of denuded crystalline rocks; for on Eua, the most southerly of the largest islands, a specimen of diabase has been obtained from a boulder, the position of which proved that it belonged to the island itself. The supposition of a base of crystalline rocks is further proved by the discovery of red garnet and blue

tourmaline in the calcareous andesitic sandstones of Eua. Of the New Zealand fork of the Melanesian Plateau we have a very comprehensive knowledge of the geology of the largest group of islands, namely, New Zealand. The features resemble those of the continent of Australia. There exist areas of ancient sedimentary and plutonic rocks; strata of Mesozoic are known, as well as considerable areas of beds yielding fossils with a decided Tertiary facies. The modern volcanic phenomena are among New Zealand's most marked features. The facts abovementioned show the continental nature of the plateau, but so far there has not been brought forward evidence to show at what geological period they were first severed from the neighbouring continent. The absence of Mesozoic rocks from any of these islands may mean either that the elevation which took place after the deposition of the earlier rocks placed the whole of the plateau above the ocean during that period, or it may be due to the imperfection of our knowledge. The balance of evidence brought forward by Professor Hutton is in favour of a connection between New Zealand and Australia during Cretaceous times, but not later; and the Director of the Geological Survey of New Zealand can find no clear evidence of a connection with Australia during the Tertiary epoch. The connection between the two during Cretaceous times must have left some marks of its existence in Australia, and it is to this continent that we must look for aid. The Lower Cretaceous Rocks of Australia were deposited in a comparatively narrow area which connected the Great Australian Bight with that of the Gulf of Carpentaria, which may represent a portion of that ocean. After the deposition upheaval resulted, throwing the beds into broad folds, and allowing denudation to go on for some time. This upheaval was followed by depression, which formed shallow seas in which the Desert Sandstone Beds (Upper Cretaceous) were laid down. From this we see that in Australia during Cretaceous times earth movements of a violent character went on. Whether that elevation was sufficient to connect the whole of the Melanesian Plateau is an open question. To do so would require an elevation of about 8,000 feet. That a connection between New Zealand and Australia existed at some time is evidenced by the discovery of bones of a Moa in Queensland. To deny, even upon this evidence, that a connection existed is tantamount to admitting the doctrine of the independent creation of species. The evidence of the distribution of a single species of land snail does not appear of itself to warrant the great changes which Mr. Hedley requires. It is only the accumulation of such evidence from sister sciences that we must look for final proof; still Mr. Hedley's facts are worthy of the serious consideration of those to whom "A Study in Ancient Geography" is of interest.

SIXTH ORDINARY MEETING.

EIGHTH SESSION.

THE sixth ordinary monthly meeting of the eighth session of the Royal Geographical Society of Australasia, Queensland Branch, was held in the Museum Library, Brisbane, on the evening of Wednesday, May 17, 1893. The President, Hon. A. C. GREGORY, C.M.G., M.L.C., F.R.G.S., occupied the chair.

The Hon. Secretary, Mr. J. P. THOMSON, read a letter from his Excellency Sir H. W. Norman, expressing regret that he was unable to be present at the meeting owing to a prior engagement. His Excellency stated that as an old Fellow of the Royal Geographical Society of London, as well as a member of the Queensland branch of the Australasian Society, he would have had great pleasure in congratulating the branch upon the valuable and important privileges conferred by the former upon the latter. He trusted many Queenslanders will have the opportunity of enjoying these privileges, and His Excellency hoped that in future days he would often meet Queenslanders at the meetings and entertainments of the Royal Geographical Society in London.

The HON. SECRETARY also read a communication from the Royal Geographical Society of London, stating that at a meeting of the Council of that body held on the 24th February, 1893, the following resolutions were adopted.:—(1) All *bona fide* Members of the Queensland Branch of the Royal Geographical Society of Australasia to have, while in London, the privileges of admission to the Meetings of the Royal Geographical Society, and of the use for the purposes of reference of the the Map Room and Library. (2) The President and Secretary of the Queensland Branch of the Royal Geographical Society of Australasia to be invited to the banquets and entertainments of the Royal Geographical Society of London, as guests of the Society. (3) Members of the Queensland Branch of the Royal Geographical Society of Australasia to be allowed to purchase copies of all the publications of the Royal Geographical Society of London, on the same terms as Fellows of that Society pay for extra copies.

The Hon. Secretary said, that on behalf of the Council, he had very great pleasure in moving the following resolution :—
"The members of the Queensland Branch of the Royal Geographical Society of Australasia, having learnt with much pleasure of the privileges offered to them by the Royal Geographical Society of London, in its resolution of the 24th February last, desire to place upon the records of this meeting their very cordial thanks to the officers and council of that body for the countenance given to the Queensland Branch, and resolve that the action of the Queensland Council, in recommending that the said privileges be accepted and reciprocated, be confirmed."

Mr. Thomson stated that some time ago he had communicated unofficially with the officers of the Royal Geographical Society of London, urging them to enter into reciprocal relations with the Queensland society for the purpose of securing to its members extended privileges, and stimulating its supporters to greater exertion, believing that a closer union would be mutually advantageous in promoting the interests of their common object, and would likewise very greatly strengthen the position of the local society. It was very gratifying to him that the object the council had endeavoured to attain was now within reach; and it was, moreover, a matter for congratulation that the good work of the Society was fully acknowledged and appreciated by one of the strongest and most influential geographical societies of the world. It was a striking example of what can be done in Queensland by the diligent and steady effort of a small and well-organised body of workers.

The resolution was seconded by the Vice-President, Mr. R. Gailey, and unanimously carried.

The authors read the follwing papers :—

The "Stone Age" in Australasia.

By Captain Wm. Campbell Thomson.

The natives of this part of the world form quite an exception to all other primitive tribes who have passed through from the "Stone Age" to that of Copper, Bronze and Iron; while here there has been a sudden transition from the rough and highly-polished stone implements right on to that of steel.

There is no doubt that the Spaniards, in the early part of the sixteenth century, were the first to introduce iron, and subsequent navigators have been solicited by the natives for "tourie" and "wourie." Bouganville, in 1760, found the natives of the different islands clamouring for "wourie"—names derived from the Spanish root signifying iron.

Since that time the "Stone Age" has been rapidly on the wane. There is an important fact to notice here, that although the "iron or steel age" has entirely stopped the manufacture of the polished stone implements, there is yet a large tract in the North and West of Australia where the natives continue to make their spear-heads from a "vitreous" kind of stone, and by a knowledge of the cleavage obtain the three sides like a bayonet, with the edges and point as sharp as a knife; this, however, has of late years been supplemented by the use of telegraph and fencing wire.

The stone axes and adzes were made from the green stone, a kind of trap or igneous rock. In New Zealand are to be found the largest and better finished of these implements, and corresponding with those found in New Guinea—both countries having been the scene of active volcanic disturbances, thus causing the formation of the aforementioned green stone. In the latter place the spear-heads are made of obsidian, or volcanic glass. In the Friendly and Fiji islands the same kind of stone is used, but differing in shape. In New Zealand and New Guinea the axe is long and *flat*, while in the Friendly and Fiji islands it is long and *round*, and comes to an edge abruptly, being identical with those found in the South of Ireland.

Throughout the whole of Australia the axes are made oval and are not polished, showing that less care has been bestowed upon them there than anywhere else, and corresponding with those found in the Danish peat. This would suggest an equal insecurity for property and an utter absence of higher social laws, for there would be little encouragement to expend labour upon anything which might be wrested from them by brute force, where "might is right" was the law of the land.

In New Zealand the Stone Age has been contemporaneous with a much higher state of civilisation than we are at first led to believe, for wherever the polished stone axe or implement is

found there will be a much higher state of civilization than where these are found in the rough state; in other words, the finish of the stone implement is an index of the degree of civilisation attained.

Coeval with the polished stone age there are many wonderful carvings in wood and ivory, and images sculptured from blocks of coral and pumice-stone. In New Zealand are to be found small images representing the human body, made out of the green-stone, which must have taken a vast amount of labour to accomplish. On Easter Island there are many figures, representing the human body, several of which are over eighteen feet high, and others lying in an unfinished state as if the workmen had suddenly left off work. When this island was visited by La Perouse in 1757, the natives knew nothing whatever of the history of these wonderful monuments. On Pitcairn Island, which is similarly situated, stone arrow-heads have been found, but other evidence of former occupation is wanting. Both these islands are comparatively small, but the relics found would suggest they have been of a much greater extent, with a population with facilities and tastes to have conceived the idea of handing their name down to coming ages. Evidence is abundant showing that great geological and geographical changes have taken place, not only here but throughout the whole of Polynesia, and that these islands are but the mountain peaks of a vast continent that has been submerged, and the remnant of the survivors had been driven to the mountains, and may not this be a cataclysm similar to that mentioned by Plato of the great continent known as the Atlantis?

In the Friendly Islands or Tongatabu, there is a strange monument of a pre-historic age where their great chiefs are buried. These stones are suggestive of the Druidical temples found all over Great Britain. The vicinity of these monuments has been looked upon from time immemorial as neutral ground, and hostile tribes could land and remain unmolested, and even outlaws made for this place and remained until a reconciliation could be effected; this corresponds with the cities of refuge mentioned in the Bible.

In Fiji we find highly-finished canoes and the peculiar system in their carvings, and their pottery is of no mean order; so that

although stone implements were used, it does not argue that the natives had not the ability to recognise the advantages of a harder substance, but rather that it was not procurable The intelligence which could grapple with the thoughts contained in their mythology would certainly lift them above the level commonly assigned to the savage with a stone axe.

In New Guinea the carvings, sculpture and paintings—the latter, although rude—show a much higher development than is to be found in any other part of the world contemporary with the Stone Age. Their drums used at great gatherings have rings around them, showing the five lines and four spaces which would imply a gamut similar to our own. On their shields and clubs they have hieroglyphics detailing the heroic deeds achieved by their owners. On the head-boards of their canoes there is quite an elaborate system of carving, setting forth the grandeur of the construction and the wonderful feats that have been performed on board; in some may be seen modern innovations introduced since the arrival of the white man, but the difference is marked as that between the French and Dutch schools of painting. There is a marked similarity in the old system of carving as shown on the chunam spoons, where they usually carve a human head, which is identical with the North American Indian type.

Comparing the superior races of the Polynesian islands with those of Australia, one cannot but be struck with the inferiority of the latter, and on viewing the general surroundings of both, a light is thrown adown the vista of time to a common origin. Startling as this appears to be at first sight, it is better understood when we see the geographical changes that have taken place at a comparatively recent date, speaking geologically. Nothing more clearly shows an innate inferior intellectual development than the non-existence of good spirits in their mythology; for instance, in Australia it is the evil spirit, or "devil devil," they take care to propitiate, and they stand upon the same moral level as our criminal class, who would from mere dread pay more respect to the arm of the law than to a minister of the church.

In the Fiji Islands they have many stories suggestive of some of our Biblical incidents, particularly in the Island of Kandavu.

They have a story of the Flood, and throughout the whole there is a silver thread of thought as taught in the doctrines of the New Testament. The legend is as follows :—At a remote period, or as the natives express it, "Mamau" extending his hands into space. The god lived with the people in the village on the most friendly terms, giving them good fishing, good winds for their voyages, and fine seasons for their yams. This intimate and good feeling continued for some time, when the god called the people together and told them he was going away out of sight to sleep in a cave, but that they would be taken care of as before. and that they were to bring their offerings regularly and pass them into the cave. This duty was carried out strictly by those who had seen the god ; but in course of time another generation came, who rather turned to ridicule the old stories of their fathers, and they began to neglect going to this cave ; then a little dove whispered into the ear of the god that the people were not so attentive as they used to be, whereat the god awoke and sent out another dove to tell them that he was very angry with them, and unless they returned to their former religion he should punish them. This caution they also turned to ridicule, with the exception of one family who went out of the village and lived apart, and continued to take up yams to the god to eat ; in the meantime the town was fenced around and a deep trench dug behind, yams and figs brought in, and everything got ready to resist the god. Again the dove appeared and spoke to them without bringing them to a sense of their duty, and to show how little they stood in the awe of the god, they killed the dove with an arrow or spear, piercing its breast, and to-day they point to the "mungi-tungi," a species of dove with a red spot on its breast, as a proof of the truth of the story. The dove not returning, the god became very angry and shook the whole mountain of Mbukie Levu and told the family beforementioned to get a big canoe built. The trees selected for this purpose were a long way inland, and much fun was made by the others who came to eat at the feast and help to build the canoe. By-and-bye a big rumbling noise was heard, and the god turned over and shook all the island and came down to the village to find them in battle array, and heard defiance hurled at him from behind the pallisading, so he just threw his club up and broke a

hole in the blue above and the water poured down and all the people were drowned, save those in the canoe, who after a long time sailing about grounded on the top of the high mountain on the southward of the island.

In the Samoan Islands, particularly, there is a strange natural phenomenon which so far has been overlooked or very sparingly mentioned by naturalists. On the night before, the night of, or the night after, the first quarter of the October moon the sea is found to be covered with a mass of long white worms like the cobra, called Pololo. The natives are very fond of it, and it is talked about for months before the time. They paddle out in their canoes and fairly gorge themselves with this, knowing that in a day or so they will all disappear as mysteriously as they came. They tell of a time when they were making a long journey in their canoes that their god was good to them and gave them this every day, but that they were not to store any up but trust him from day to day; but one old fellow thought it just possible that the god might forget, so he put some away in store, but it began to smell so bad that the god found him out and was very angry and stopped the Pololo; but to let them see the power he had he sent it every year to show them what they lost for their want of faith.

In Fiji, when anyone sneezes, they all with one accord say "mbula," or long life to you; and, strange to say, a similar custom prevails in Scotland, for when anyone sneezes they say "God bless you." They tell of a time when a fearful epidemic carried off nearly all the people—one of the principal symptoms being violent sneezing. Herodatus speaks of a like plague, and particularly mentions the invoking the protection of the gods when anyone sneezed.

All these strange similarities of ideas or customs, it may be said, could be classified by the axiom that similar circumstances develop similar ideas, and quite apart from actual direct communication.

In reviewing the foregoing remarks, it is noticeable that the intellectual standard is far in advance of the mechanical appliances used, and could only be accounted for by a sudden severance from the advantages of civilisation, leaving but an imperfect account of their former advancement embedded in their traditions and old folk-lore, leaving no broken links, but rather pointing to

a complete chain of evidence of a relationship of the ancient civilisation, so graphically portrayed in Prescott's History of the Inca and Aztecs of ancient America.

Australasia is a new field for the study of the human race from a fresh standpoint. The great changes that have taken place geographically have, by a better understanding of the classification of geological periods, thrown a better light on prehistoric man in this part of the world. We find here the so-called savages with the stone axe and call them primitive races, but as evidence is collected we soon find it like a mass of loose leaves from different volumes treating on the same subject from opposite standpoints. The black and woolly-headed races are undoubtedly the aborigines, while the fairer and more advanced throughout Australasia, with their wonderful traditions, point to a time when they came to occupy the land and drive the black races to the mountains or away to the westward, as the Saxons drove the ancient Britons from the eastern seaboard. This accounts for the American impress in tradition and handiwork throughout Polynesia. At the same time there is undeniable evidence of a western civilisation, which gave rise to the theory that the Pacific Islands had been peopled from the Malay Peninsula, and there is certainly much in support of this theory, but a closer study of the evidence shows that the two tides of civilisation met on the meridian of the eastern part of Australia. This seems to be the only way to account for the many peculiarities of both eastern and western origin. Further evidence will no doubt confirm the theory that Polynesia once enjoyed a very high state of civilisation derived from America, which received it from the common centre from whence the tide flowed east over Africa and Asia. The western tide passing over Australasia has had the story of its history almost lost by a fearful cataclysm that depressed a whole Polynesian continent under the sea, leaving but mountain peaks as monuments of a great past and altering the whole geographical appearance of Australia.

The limits of this paper will not permit of further detail, but enough has been said to show that a most interesting field is open to the workers of this Society, in discovering how the blackfellow with the stone axe comes to be possessed in shadow with many of the highest thoughts of our boasted civilisation.

The Brisbane River Floods of 1893.

By The Hon. A. C. Gregory, C.M.G., M.L.C., F.R.G.S., Etc.,

President of the Royal Geographical Society of Australasia, Brisbane.

The serious injury to property in this city, which resulted from the recent floods in the Brisbane River, indicates the desirableness of instituting inquiries as to the probable recurrence of similar visitations, and whether this flood has been of such an abnormal character as not to admit of being classed with periodical occurrences. In the first place, the historical records of this part of Australia only date from 1824, in which year it was first occupied by settlement. Since that year a period of sixty-eight years has elapsed without any flood of equal magnitude having been observed, and though there have been some indistinct aboriginal traditions of a flood of equal magnitude little reliance can be placed thereon, as a generation has passed away since it could have happened. The next point of inquiry is whether the rainfall which caused the late flood was or was not in excess of that which has occurred in other localities in this part of Australia. During the period of the floods the rainfall, though equal to the maximum observed on several previous occasions, was not materially greater per diem than had been recorded in previous years, and it was more in consequence of the longer duration of heavy rain over the whole of the watershed of the river that the greater rise of the flood waters is to be attributed. Taking our written history as a guide, the evidence is in favour of the conclusion that floods of the height of the last are of infrequent occurrence, and that the intervals may be even more than seventy years, but there is no guarantee that there may not be cycles of years of excessive, as well as of moderate, rainfall, and that there may not be periods of frequent recurrence of these calamitous visitations. And there is nothing in our written records to assure us that the rise in the near future may not be even greater than in the present year. Having exhausted the evidence of history as written by human hands, we must turn to that which has been inscribed by natural forces An examination of the geological conditions of the area now known as the Moreton district

indicates that during the latter part of the mesozoic or carbonaceous period the waters of the valley of the Upper Brisbane flowed southerly past Ipswich, and thence over our present boundary into New South Wales. During the succeeding cretaceous period the land was much depressed, and the ocean extended to the foot of the Devonian range on which Brisbane is partly erected. At the close of this period there were extensive outbursts of plutonic rocks of which porphyritic ridges at Kangaroo Point, Spring Hill, etc., are illustrations. But the principal development of these eruptions formed the range of mountains which now divide Queensland from New South Wales, presenting enormous masses of rocks such as Mount Lindsay and Mount Warning; while the Glass-house Mountains to the north are outliers of the same formation. These porphyritic upheavals were followed by the basaltic eruptions, which formed the Darling Downs and the isolated developments at Ipswich, Redbank, and Cooper's Plains, the Tambourine Mountain, etc. The disturbance of the surface level of the district was excessive. The ocean receded, and the waters of the Brisbane Valley being pent back, burst through the coast range and cut its channel along its present course. It is from this date that the geological history becomes of practical interest as regards the question of past, present, and future floods, because it was at this time that the present system of watercourses and river channels was first established. How far the ocean receded is problematical, but it is probable that the land extended to the eastern shores of Moreton and Stradbroke Islands. There is, however, conclusive evidence that for a long time the relative level of the sea was about 80ft. below that which exists at the present time. The evidence of this is that when small watercourses flow from a hilly district they cut V-shaped valleys with the actual stream bed in a narrow channel, but when these meet the ocean or tidal waters they spread out into shallow beds, and do not erode them more than a few feet below the water level for the time being. If, however, the level of the ocean were suddenly raised the result would be that the lower parts of the valleys would be filled with water, and then gradually silted up till they formed alluvial flats, through which the narrow channel of the watercourse would flow nearly on a level with the water into which

it discharges. Of this condition of erosion and subsequent filling up of the lower parts of valleys we have well defined instances in Brisbane—the Frog's Hollow; in the suburbs—Paddington, Milton, and Red Jacket Swamps. In these localities, in the course of boring for foundations and driving piles for railway and other works, it has been found that the alluvial flats fill V-shaped grooves to the depth of 80ft., and that while the immediate bank of the river has been raised by the detritus of floods to 20ft. above high water, the back parts of the valleys are scarcely above the tidal level. The extent of the erosion indicates that the lower relative level of the ocean must have existed for many thousand years with little variation. Then a change of elevation brought the ocean level to some 20ft. or 30ft. above that which now exists, and river silt, containing minerals, recognisable as coming from the Upper Brisbane Valley, was largely deposited on the top of the ridge between the North Quay and George-street, from Herschel-street to Government House. This deposit was easily traceable in 1860, before the surface was covered with buildings and the contingent excavations and filling up of hollows interfered with the natural condition of the surface soil. The detritus from the river in this elevated position presents the aspect of great age, as much of it is consolidated so as to form a soft rock resting unconformably on the Devonian schists. And the period during which it was deposited was geologically limited. Then another change of level occurred, and the ocean retired to its present position, and silt was no longer deposited on the North Quay ridge, and the raised beach near Caboolture became an inland feature. And this condition has evidently remained undisturbed for more than a thousand years. It is at this stage that we come to the evidence that more especially interests us as regards the previous occurrence of floods, their frequency, and maximum height, as from the data it may be possible to make at least an approximate forecast. The banks of the Brisbane River, immediately above the city, are composed of Devonian schists, on which rest deposits of river silt, which has the distinctive character of containing scales of mica, derived from the granite rocks, in the valley of the Upper Brisbane, while mica is almost absent from that of the schistose rock. And it is thus easy to trace the height to which former

floods have covered the rocky declivities on the banks of the river, while the cuttings for road formations have exposed several sections of the successive depositions of drift. The numerous layers of drift are so irregular that it is not practicable to determine how many floods contributed to their accumulation, but the number of those inundations which rose to within 10ft. of the last flood must have exceeded fifty, and half of this number reached the same height as the flood of the present year, when the water rose a few inches above the upper limit of the river silt drift. From this evidence it may be inferred that the flood of 1893, while fully equal to those of past years, did not materially exceed its predecessors, and that while we ought to provide for the future rise of the river to the same height, there is little probability of higher floods. There is one circumstance which may have affected the rise of the river in 1893 as compared with those of older dates. The ancient inundations resulted from rainfall in a tract of country covered with high grass and surface vegetation, and the channels of the smaller watercourses were choked with scrub and trees, so that the flow-off of water was much impeded and did not reach the lower portion of the river in time to co-operate with the rainfall in that part, and thus the flow would be of longer duration but of less volume. Now the grazing of large herds of cattle has reduced the grass to a comparative short growth, and the treading down of the banks of the watercourses has caused the channels to be less obstructed, and thus the rainfall flows off the surface of the ridges more freely, and reaches the main river in less time than formerly; and as a result of this rapid flow the floods must be less accumulated in the upper valleys and greater but of less duration in the lower portion of the river. It is difficult to estimate the extent to which these conditions increase the rise of the water near Brisbane, but it is not likely to be more than a small factor in the total result. The next question is whether any measures can be adopted for protection against future floods. There have been suggestions that canals might be cut so as to divert the floods from the part of the river on which the city is built. But the country on each side of the Brisbane valley consists of such elevated rocky ridges, and the distance to any point of discharge is so great, that the cost would

exceed the value of the whole of the property from which the flood-waters could be diverted. Another scheme which has been proposed is to cut away the points of land round which the present river channel bends at sharp angles, but this scheme is equally objectionable as the preceding one on ground of excessive cost and the additional defect that at the best it would be only a partial remedy. Any attempts to restrain the river within its ordinary channel by embankments would be futile, as the enormous local rainfall would as effectually inundate the low ground behind the embankments as now results from the overflow of the river in its present condition, and though such embankments have been effective in the protection of cities from flood, it is only in cases where they are situated on flat country, and the river banks are higher than the general surface of the country, and there are facilities for drainage away from the channel of the watercourse. We are, therefore, limited to such measures as may be applicable to individual cases such as the erection of bulk stores beyond the influence of floods. And in those cases where storage within the limits of inundation is unavoidable, provision should be made for the quick removal of goods from the ground floors to the upper floors. Unfortunately this is not so easily done under existing conditions, as the gas engines which are generally used to work the lifts are inundated and rendered useless, and even if placed above flood level the gasworks are unable to supply gas. Hydraulic motors are unavailable in times of such great emergency, and electricity is certain to be disarranged, while manual labour is the least reliable power which can be invoked on such occasions. These difficulties might, however, be in some measure overcome by fixing small steam engines above the flood level, so that they could be coupled with the hoisting machinery of the lifts when other motive power failed; and thus, with only the aid of the regular staff of a warehouse, an enormous quantity of goods might be raised beyond the risk of injury.

The Hon. Secretary, in discussing the President's paper, referred to a communication from Mr. H. O. Forbes, on the "Floods in Queensland," published in the "Geographical Journal," for March last, in which the writer, amongst other absurd assertions, stated that "in the West End of South Brisbane," he learnt, "that only some twenty-five houses are left standing out of 500, and these were covered several feet deep in the water, while between thirty and forty persons have been drowned." He thought it a pity that Mr. Forbes should have written upon a subject of which he apparently knew nothing.

SEVENTH ORDINARY MEETING.

EIGHTH SESSION.

THE seventh ordinary monthly meeting of the eighth session of the Royal Geographical Society of Australasia, Queensland Branch, was held in the Museum Library, Brisbane, on the evening of Friday, June 23, 1893. J. N. WAUGH, M.D., etc., one of the Past Presidents of the Society, occupied the chair.

The author, who was introduced by the Hon. Secretary, read the following paper :—

Grammarial and Glossarial Similarities of the Languages of New Guinea and Fiji.

By Mr. S. W. BROOKS, J.P.

[Pronunciation of the Fijian, New Guinea and other foreign words: *Vowels*, in every case have what is known as the Continental sound—a, e, i, o, u as ah, eh, ee, oh, oo. *Consonants*, in New Guinea, Tongan, Tahitian, and Gilbert Is. words, as in English. In Fijian words, as in English, excepting b, (mb) ; c, (th) ; d, (nd) ; g, (ng) ; and q, (ngga).]

When reading some months ago, for the purpose of reviewing, the excellent work of your Secretary on "British New Guinea," it seemed to me as I went through the "Dialects" portion of the Appendices to that work, that among the words therein given there were not a few which had considerable likeness to familiar Fijian words, and when I wrote my review of the book I wrote "Some words are exactly, others nearly, like words of the same meaning in the Fijian tongue. I think a very interesting paper might be written on this matter." Your Secretary, who has a keenness of sight and scent almost preternatural for that which may bring papers to your Society, fastened upon these words unguardedly written, and ceased not his persistent requisitioning until I promised to attempt to supply that paper which I had said I thought might be written on the subject. Allow still another foreword : In common with many Queensland people I take great interest in the Possession, which, while it is in a sense an appanage of all Australia, is, in more than topographical propinquity, of special nearness to Queensland. I watch with

interest the various processes by which the foundations of a settled civil government are being laid, and the people trained in obedience to the elevating influences of civilisation. And, by way of still closer personal linking to the language of New Guinea, I may add that in 1891 when travelling north to Cooktown, I had for fellow passengers the Reverends Messrs. McLaren and King. Every day those gentlemen were assiduously working to master certain New Guinea vocabularies, and as I had been in the same position in relation to the Fijian language I ventured to suggest to them a method of procedure which I was certain would make them masters of the speech more quickly and more easily than would the method they were pursuing. My suggestion was adopted, and for several days I found myself a student with them of the New Guinea language. My qualification for speaking of the Fijian language is found in the fact of a more than ten years' residence in the group. Now, turning to my present aim and plan, I must request that my own words quoted at the outset be borne in mind; my aim is to set forth the word-identities, or similarities, which are to be found in the languages of New Guinea and Fiji and, incidentally, other parts of Polynesia. I purpose, however, to go a little outside that matter, and point out similarities and identities in the structure of the two languages or, put in two words, I shall deal with grammarial and glossarial similarities. Beyond these two points I do not intend to travel. I have no intention to attempt to-night any scheme or theory concerning the peopling of Polynesia; I have no ethnological hobby to place before you; all I can hope to do is to be able to place on record a few of the language points which may be of some slight use to the ethnologist, and may serve in some slight degree to aid him in his endeavour to fix the course of the original settlement of the island-world about us.

Before treating of the similarities between the two languages, a striking dissimilarity may be pointed out—the striking separateness or unlikeness of many of the dialects—the differences being not merely that of substitution of letters, with moderate differences of vocabulary, but real, radical differences, which must make intercourse impossible. It may be that the Motu dialect, spoken at Port Moresby, is understood by several tribes on that part of the coast, but a glance at the dialect tables given in Mr.

Thomson's work and the added tables in Sir William Macgregor's Reports will, when considered in relation to geographical features of the Possession, show that there must be many parts of the Possession where Motu would be as little understood as is the French language by the general English people. The following quotation from one of Sir William Macgregor's Official Despatches brings out this feature quite clearly. During one of his official visits of inspection to the western end of the Possession in March, 1891, he was accompanied to Dabu by natives of Mowatta and Turituri. The language spoken at Turituri is a mere dialectic variety of the Kiwai language, but no Dabu native understood a word of Mowatti or Turituri, and the natives of Mowatti and Turituri were ignorant of Dabu, but some of each (Mowatti and Turituri natives) knew a few words of Saibai, and that was the only way we could hold communication with Dabu, *i.e.*, by means of the language of an island belonging to Queensland. "The dialects of the tribes of the Lower Fly River differ from those of the upper in, as far as we know, every word. Of the structure of the languages we know nothing save that in all every word ends in a vowel." Such is not the case—at any rate to anything like the same extent—in Fiji. There are dialect differences, but if a man understands the Bau dialect he may work his way through the whole group from Kadavu to Cikobia, and from Lakeba to Yasawa. This is emphatically true to-day because all the books which are printed are in the Bau dialect; but it was the truth of it which sixty years ago led the missionaries to accept the Bau dialect as the language in which the Bible and all other books should be printed. It is not easy to see how any such resolve will make the Motu tongue the language of New Guinea as a whole. Mr. F. E. Lawes thinks it will become the language of the Central District, 145 degs. E. to 148 degs. E.:—"The more I come into contact with the natives of my district, the more am I convinced that Motu will be, in the near future, the language of the district."

Turning now to similarities, harmonies, agreements: and of these let us first look at those which are to be found in the structure and syntax of the languages—the grammarial similarities. 1. The affixure of the possessive pronouns to certain nouns. Generally speaking these are, in Fiji, the nouns which

are names of members of the body, and nouns which express relationship: or as set forth in Hazlewood's Grammar—"Relationship is perhaps the more prominent feature in this form of speech, for the possessive pronouns seldom or never follow the noun in this way, unless there be relation or intimate connection between the possessor and the possessed." The form is used with *luve*—son or daughter, but not with *gone*, child. It is used with *ulu*, head, when I speak of my head, but not when I speak of my head of fish or pig to eat. Used of *sui*, bone, when I speak of a bone of my own body, but not when I speak of some bone in my possession, say at a nigger minstrel concert. Taking the first abovenamed word *luve*, son or daughter, we have—

Singular—Luvequ, my son or daughter; Luvemu, thy son or daughter; Luvena, his or her son or daughter.

Plural—Luveda, our son or daughter; Luvemudou, your son or daughter; Luvedra, their son or daughter.

Tama, father; Tina, mother; Ulu, head; Yava, foot; Liga, hand, follow the same usage.

In these examples the singular terminations *qu*, *mu*, *na*, and the plural terminations *da*, *mudou*, and *dra* are respectively the final syllables of the first, second, and third person singular and plural of the Possessive Pronouns, namely, *noqu*, *nomu*, *nona*, *noda*, *nomudou*, and *nodra*; so that instead of using *noqu luve* for my son or daughter, the last syllable of the pronoun is affixed, and gives luvequ, and so on, through the series.

The possessive precedes all nouns except those of the classes I have named, thus—Vale, house; noqu vale, my house; nomu vale, thy house; nona vale, his house; waqa (wangka), canoe; noqu waqa, my canoe; nomu waqa, thy canoe; nona waqa, his canoe; titoko, stick; noqui titoko, my stick; nomui titoko, your stick; nonai titoko, his stick.

Coming now to New Guinea, the same peculiarity is found in some of the dialects. The exceptions are the St. Joseph District, Saibai, Kiwai, Koiari, Koita.

In some dialects the use is peculiar—there being not only the possessive termination, but also the preposed personal pronoun. For example, in Sariba, Tamana is father; Yau is I; Yogu is my; Koa, thou; Tenem, he; Koayom, thy; Teina, his; while My father is Yau tamagu; Thy father is Koa tamam; His

father is Tenem tamana. In St. Aignan, Bulaa, Nala, Sinaugolo, and Nada the same use appears to prevail.

As examples of the Fiji style take Murua, wherein we have Tamagu, my father; tamamu, thy father; tamana, his father; Inagu, my mother; inamu, thy mother; inana, his mother. In Dobu—Tamagu, tamaiu, tamana: my, thy, his father; tsinagu, tsinaiu, tsinana: my, thy, his mother. In the case of the Dabu, Toaripi, Domara, and Mairu dialects, the vocabulary and the specimen sentences are discrepant and not reconcilable by me.

In the language of the Gilbert Islands the same usage holds as in Fiji. In a small Reading Book I have, there is the story of George Washington and the tree-cutting, in which George's confession begins "Tamau" my father, and "Tamana" appearing after, is his father. It is seen also in Atu, head; waena, foot; bai, hand; natin, son; mata, eye. The same usage holds in Tonga and in Tahiti.

2. One of the most abundantly useful features of the Fijian language is the use of the prefix particle *Vaka*—a particle of frequent use, large utility, and varied value. Quoting Hazlewood, it—"(1) Changes nouns into adjectives, as Vuravura, world; vakavuravura, like the world, worldly. (2) Changes adjectives into adverbs, as ca, bad; vakaca, badly. With numeral adjectives it means so many times as the numeral expresses, as rua, two; vakarua, twice. (3) With nouns it also implies the possession of the thing expressed by the noun, as—were, garden; vakawere, having a garden. In this sense also it changes nouns into adjectives. (4) It changes nouns into verbs which signify to cause a thing to have possession of what the noun expresses, as—dia, handle; vakadiataka, to put a handle on. (5) Changes nouns into adverbs by adding the idea of wholly or only—era sa lako vakatagane, they are gone men only, no women. (6) Changes adjectives into verbs—balavu, long; vakabalavutaka, to cause to be long. (7) Changes intransitive verbs into active transitive. (8) Changes a few passive verbs in same manner." But no further uses need be given—the curious will turn to Hazlewood.

I can find but slight trace of this highly useful feature in the New Guinea dialects, yet it seems to exist. It certainly does in the Motu language as appears from the Grammar of that language—

a highly valuable contribution to language literature by the Rev. Mr. Lawes—a book which I reviewed, on its appearance, in a Round Table paper, and of which Sir William Macgregor rightly says in his 1889-1890 Report, at page 22, "Mr. Lawes has prepared and published as a separate work, a comprehensive grammar and dictionary of the Motu tongue—a work of the careful, exhaustive, and solid kind, that will be the more admired the more it is examined and tested. It will undoubtedly remain the standard authority for all time." There is a copy of this Grammar and dictionary in our School of Arts, which was procured on my own suggestion from the Government Printer of New South Wales, by whom it was published. The example of the causative is—*Diba*, to know; *Hadiba*, to cause to know; while the reciprocal element is secured by the prefix *He*, and the affix *heheni*, as badubadu, anger; *Hebadubaduheheni*, to be angry with one another. Sir William Macgregor in his notes preceding the Kiriwina dialect says "There seems to be some trace of a causative prefix, *baki* or *bake*, as in bakimate, to kill," and, using the same word for search, I am disposed to think that it exists in the Murua dialect, for I find the phrase *vini katamate*, to kill woman, and according to the vocabulary "vini" is woman, and "mate" death, leaving the particle *kata* for the causative. And in the Dobu dialect we have probably the same thing in *Loi*. *Moasa* is death; *Loimoasa* is kill, or, may we assume, to cause to die.

Language men tell us the same element is found in the *Hiphil* and the *Hophal*—the fifth and sixth of the seven conjugations of the Hebrew verb, which may be seen in the tabulated paradigms in any Hebrew grammar. It is found in the Tongan language as *Faka*, and also in the Tahitian as *Faa*, turning nouns, adjectives and verbs-neuter into verbs active, and with the suffix *hia*, verbs active into verbs passive. Take one specimen: *Ora*, life; *Ora*, to live; *Faaora*, to cause to live; *Faaorahia*, caused to be alive; and, unless my judgment is at fault, the use obtains in the Gilbert Islands, for in St. Matthew's Gospel I find *kamatea* for kill; in the language *mate* is death, leaving *ka* as a causative prefix.

3. The numbers of the pronouns, both personal and possessive, form serious stumbling-blocks to the learner of the Fijian

language. There are in the first place four numbers, instead of our paltry English two, singular and plural. These four are singular, dual, triad, and plural. This were enough to cause some difficulty, but when to this is added the *inclusive* and *exclusive* features in the first person of the dual, triad, and plural numbers, the fog thickens. The examples necessary to make this feature clear would take too much time and require too much space. The curious may feast on the matter in Hazlewood's Grammar.

In the New Guinea dialects, as given in three annual reports of Sir William Macgregor, I find evidences of this useful and precise quality in three instances, viz., Saibai, the Murua, and the Dobu dialects; the two last, be it noted, are islands at the eastern end of the Possession, and the first an island near the western boundary.

These are the main grammarial harmonies which lie upon the surface, and are readily recognisable to those whose knowledge of the New Guinea language is, like my own, slight and superficial. Fuller knowledge will probably reveal more numerous similarities, but for present purpose these must suffice.

We turn now to the glossarial or word harmonies, and concerning these a prior word may be allowed. In looking over the extensive lists of words which have been compiled, one desires to feel sure that they are correct: in some cases I felt as certain as it was reasonable for a man ignorant of the dialects to feel, that there were errors. I know, as any man of average brain and sense must know, that the work of transferring to paper the uttered word of say an Australian or a native member of any of these barbarous peoples, is so difficult, that unless the man who sets himself the task has, in a special degree, the faculty for doing that special thing, error must inevitably creep in. That the adoption of the "System of Orthography for Native Names of Places (and things) adopted by H.M. Lords of the Admiralty and the Royal Geographical Society" lessens greatly the risk of error is however very certain. So much moreover depends upon the way in which the question is put by the questioner. "The Sumai people speak very indistinctly, as if the tongue were folded, and they slur over their words so as to produce many contractions that puzzle the ear at first." The lists supplied by the

Reverends Messrs. Lawes and Bromilow and Mr. F. E. Lawes are probably beyond suspicion of errancy, as these gentlemen are all experienced South Sea scholars; and probably there are other lists prepared by Sir William and some who have been his associates from the beginning, which are as accurate as is possible. Sir William himself admits the imperfection and error of these word-lists. He says of the Kiwai table—"The vocabulary was drawn up chiefly at the village of Kiwai, and contains probably about 1,200 words. No one can know better than I do that this long list prepared in about 8 or 10 days without the assistance of any person knowing English, must contain errors." In another report, speaking of the revision of a vocabulary, he says: "There were fewer errors than might have been expected." But with whatever degree of error these word-lists be tainted, we here to-night may well at this point tender our tribute of praise to all the gentlemen who have to so great an extent contributed, by the compilation of these vocabularies, to our means of knowing our fellow-subjects.

Before touching the word similarities, a few words may here be given concerning two features in which dissimilarity either prevails, or predominates.

1. The numerals.—In Fiji the counting goes on to ten, then like our own proceeds by combinations. This is the character of the Tagula dialect, but in most of the New Guinea dialects the straight counting goes as far as five, then runs on combinations. The Kiwai (mouth of the Fly River) usage is peculiar. There are really separate words for one (nao) and two (netewa) only; thus the counting runs one, two, two-one, two-two, two-two-one, two-two-two, two-two-two-one, two-two-two-two, two-two-two-two-one, then a new word for ten, and forward by combinations of the foregoing nine. What must life be where counting is so done?

2. The colours.—In the Fijian, and some other Polynesian languages as Tahiti, Tonga and Gilbert Islands, the names of the colours are all in duplicated words, thus in Fijian—Black, loaloa; Red, damudamu; White, vulavula; Yellow, dromodromoa. So in nearly every case in the New Guinea dialects the same form prevails, but in no case is there any similarity of wording with the Fijian colour names.

Passing now to words I shall give, in briefest way, examples of words alike or nearly alike having the same meaning. In doing this I shall not trouble you with the specification of the particular dialect in which the word I quote is found. I shall give first the English word, then the Fijian equivalent; and lastly, the various similarities to be found in New Guinea and elsewhere.

Take first, *Dead*, *die*, *death*—the Fijian word is mate. In New Guinea we find emai, imata, imati, mati, mate, eba (ciba), bemasu. In Gilbert Islands we have mate; the same in Malay and Tahiti.

Tree and *Wood*—Fijian, kau; Gilbert Islands, arokau; New Guinea, au, au, au.

Canoe—Fijian, waqa (cama, outrigger); Tahiti, vaa, waka, vaka; New Guinea, naanga, waga, waga, waga, waga, waga (dam, outrigger),

Louse—Fijian, kutu; Tahitian, utu, ugutu, kutu; Malay, kutu; New Guinea, u'u, utu, gu, u, uku, utu, kutu, gutu.

Butterfly—Fijian, bebe; Tahiti, pepe; New Guinea, bebe, beba, bebebi, beba, pekekua, bebe pepe. *Insect*, manumanu; same Fijian and Tahitian.

Eye—Fijian, mata; Tahiti, mata; Malay, mata; New Guinea, mata, ma, mana, mata, maka, maha, mata, matana matana, mata, mata, ma.

Blind—Fiji, mataboko; Tahiti, matapo; New Guinea, matakebokebo.

Bird—Fiji, manumanu; New Guinea, manudigadigu, manu, manu.

Father—Fiji, tama-na; Gilbert Islands, tama-na; New Guinea, tamana, amana, amanu, tamana, auomana, hamana, tamana, tamana, tama, ama. Gilbert Islands, tamau, my father; tamam, thy father; tamara, our father; tamana, his father.

Night—Fijian, bogi; Gilbert Islands, bong; New Guinea, Ibogu, boiboi, poogi, bogi.

Yam—Fiji, uvi; Tahiti, uhi, ufi, ui, ubi; Malay, ubi; Malagasy, ubi; New Guinea, kuva, kuvi, kuvi, kuiva.

Cocoanut—Fiji, niu; New Guinea, niu, niu, niu, niu, niu, niu, nihu, nuia, niu, niu.

Come—Fiji, lako mai; New Guinea, mai, veamai, beamai, raoma, mai, omai, kumai (totola, quickly; Fiji, totolo), ra mai, laga ma, mai.

Cooking-pot—Fiji, kuro; New Guinea, uro, gulo, ulo, urona, uro.

Cry—Fiji, tagi; New Guinea, tai, agi, agiagi, tani, tagi.

Ancestors—Fiji, tubuna; New Guinea, tubuna, upuna, ubuna, tubuna, kupuna, kupuna (papa), tabuna, tubuda.

Mother—Fiji, tina-na; New Guinea, sinana, inana, inana, sinana, aidana, hinana, sinana, inagu, tsinana.

No notice has been taken of words of single or dual similarities; these may be grouped together:—

Food—Fijian, kakana; New Guinea, kanikani.

Ant—Fijian, kadi; New Guinea, kadi.

Mirror—Fijian, iloilo; New Guinea, hiro.

Evening—Fijian, yakavi: New Guinea, yaviyavia, lavilavi.

Spider—Fijian, tinaniviritalawalawa; New Guinea, lawa.

Mosquito—Fijian, namu; New Guinea, nemo.

Mosquito curtain—Fijian, tainamu; New Guinea, tainamo.

Fruit—Fijian, vua; New Guinea, naua, vuana.

Foam—Fijian, vuso; New Guinea, busobuso.

Crayfish—Fijian, ura; New Guinea, ura ura.

Maggot—Fijian, uloulo; New Guinea, uloulo.

Forbidden, sacred—Fijian, tabu: Tongan and others, tapu; New Guinea, Nala, tabu: Kiwai, sabi; Murua, gama; Nada, wara; Fly River, tarema.

In his report of a visit further up the Fly River, Sir William says:—"Each of the timid natives received a pipe full of tobacco for which they did not appear to care unless I would turn back, which was clearly indicated by a wave of the hand, accompanied by 'taréma taréma,' which with them clearly corresponds to the Pacific Islanders' 'tabu.'"

Banana—Fiji, vudi: Dobu, udi.

After so much matter of the dry-as-dust sort, the introduction of a note of a more succulent nature may be tolerated as a sort of relief in the shape of an extract from Sir Wm. Macgregor's Despatch on a Visit to Kiwai Island at the mouth of the Fly River, *9th December*, 1889.—"Next to sago the most important article of diet is the banana. The culture of this plant receives from them much attention. In the vocabulary enclosed there is a list of no fewer than thirty-six different varieties. From personal experience I can affirm that these distinctions are not fanciful, but indicate real substantial differences. About twelve

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or fifteen of these varieties have been sold to us, and some of them are decidedly superior. I have noted that the first eight on the list are generally considered the best by the natives themselves, but I have eaten of several of the others and considered them good bananas. This would no doubt be a fine field for the banana-grower of Queensland from which to obtain new varieties." In *Courier*, June 14, 1893, appears :—" Mr. E. Cowley, manager of the Kamerunga State Nursery, returned yesterday from New Guinea, bringing eleven new varieties of sugar-cane and fifty-one varieties of bananas." Sir William continues—" It is impossible not to respect a people who cultivate 36 kinds of bananas, 20 kinds of yams, 10 kinds of sweet potatoes, and who use 11 kinds of fibre and drain their gardens by ditches 4 yards apart."

Having perpetrated one irrelevancy, a further contribution of the same character may be risked.

That the practice of tattooing is widespread may be gathered from the fact that in nineteen dialects there is a word for the act which produces effects serving as a sort of substitute for the unattainable adornments of civilization. Where neither a Worth nor a Finney, Isles and Co. is possible, the adornment of tattooing should not be condemned.

Yes and *No*.—In Fiji io and sega are general (I have a list of twenty words for *No*). In New Guinea *Io* in two places and 27 other words in other places—the simplest being e, a, ea, ao, h'm. *No*—Ega, nigeri, nige, nigea having some faint similarity to sega, and 32 other words in other places.

ANNUAL MEETING.

The eighth Annual General Meeting of the Royal Geographical Society of Australasia, Queensland Branch, was held in the Museum Library, Brisbane, on the evening of Friday, July 28, 1893, at 8 o'clock. The President, Hon. A. C. Gregory, C.M.G., M.L.C., F.R.G.S., occupied the chair. There was a large and representative attendance, including several ladies.

Letters of apology for non-attendance were read from Dr. Waugh, the Hon. Sir Thomas McIlwraith, K.C.M.G., the Hon. H. M. Nelson, the Hon. H. Tozer, the Hon. R. Philp, the Hon. W. H. Wilson, the Hon. A. H. Barlow, his Honour Sir S. W. Griffith, K.C.M.G., R. L. Jack, Thos. Mylne, J. O. Bourne, A. Norton, P. Pinnock, F. X. Heeney, C. B. Fletcher, W. D. Little, and several others,

Mr. Robert J. Walker, of Leicester, F.R.G.S., was introduced as a visitor.

After announcing the receipt of many valuable and important donations to the Society's library the Hon. Secretary also read the following communications:—

Telegram from Melbourne.

For J. P. Thomson, Hon. Secretary R.G.S.A., Brisbane.

The President and Council of the Victorian Branch send their congratulations and best wishes for the success of your annual gathering.

A. C. MACDONALD,
Hon. Secretary, R.G.S.A., Melbourne.

Melbourne, 23/7/93.

Let me offer my best felicitation, dear Mr. Thomson, to your venerable President, his Geographic Councillors, and especially also to yourself, the zealous and enlightened Secretary of your Branch of the R.G.S.A., at the Anniversary Meeting. You all must be congratulated on the splendid work shown again during this past year, by which the influential exertions and forethought of your late learned President and his Council were so well maintained.

Your meetings have been of an enviable regularity of time and replete with scientific and practical interests. May then the New Year on which you enter there, for geographic purposes, be as resultful as the former annual space of time.

The previous interest evinced by your Branch in South Polar Geography encourages me to ask whether Queensland can share in aiding far southern whaling, still in the season 1893-94, by offering also a premium to such Northern steamers as could be induced to come so far east here as to operate under Australian longitudes. Commerce and trade would be promoted thereby in all the colonies with a proportionate advantage to the

public revenue also in each of our dominions. After the great successes of sealers and whalers under American meridians during 1892-1893, we here all must feel that the latent Antarctic resources ought also for the benefit of Australia, particularly in these depressed times, be opened up as early as possible, and this offer of bonus might be brought about by a speedy telegram to owners of whaling steamers, now soon from the arctic returning.

Regardfully yours,

FERD. VON MUELLER.

Report of Council, Session 1892-93.

The Council has the honour of submitting to the members of the Queensland Branch of the Royal Geographical Society of Australasia the eighth Annual Report upon the operations of the Society during the preceding year ending June 30, 1893.

There were seven new country members elected during the Session. The Council trusts that during the ensuing year members will make known to their friends the exceptional privileges enjoyed by supporters of this Branch. It is believed that the numerical strength of the Society could be very materially increased were its objects and the advantages of membership more widely disseminated and explained to local people.

The following Balance Sheet is submitted :—

ROYAL GEOGRAPHICAL SOCIETY OF AUSTRALASIA (QUEENSLAND BRANCH).

FINANCIAL STATEMENT FOR THE YEAR ENDING 30TH JUNE, 1893.

Dr.	£ s. d.	Cr.	£ s. d.
To Balance in Q.N. Bank, Brisbane, 30th June, 1892 ..	94 18 3	By Printing the Proceedings and Transactions of the Society	55 1 9
„ Entrance and Diploma Fees	10 8 0	„ Printing Circulars and Post Cards, and the purchase of Stationery and Postage Stamps	33 15 6
„ Annual Subscriptions, &c. ..	79 9 6	„ Reporting Proceedings ..	1 1 0
		„ Caretaker of Museum for attendance	1 0 0
		„ Advertising	0 9 6
		„ Sundries	4 18 6
			96 6 3
		„ Balance in Q.N. Bank, Brisbane, 30th June, 1893 .. £96 15 6 Less Outstanding Cheque .. 8 6 0	88 9 6
	£184 15 9		£184 15 9

CHARLES B. LETHEM, *Hon. Treasurer.*

I have compared all the Vouchers, Cash Book, and Bank Pass Book, laid before me by the Hon. Treasurer and found same correct.

WARREN WEEDON, *Hon. Auditor.*

BRISBANE 21st *July*, 1893.

Meetings of the Society.

There were held during the year the Annual General Meeting and seven ordinary monthly meetings of members. Most of the papers read at these were of very great value and interest in their special bearing upon the wide scope of geographical knowledge. To the contributors of these the cordial thanks of the Council are due.

Council Meetings.

Ten ordinary and two special meetings of the Council were held: the former were occupied in transacting ordinary business of the Society, and on the other occasions the Council was called together for the purpose of considering important communications from the Royal Geographical Society of London, bearing upon the subject of reciprocity. At most of these meetings there was a good attendance of Councillors and much interest was manifested in the business transacted.

Publications.

In view of the prevailing financial depression it was deemed inexpedient to incur the large expenditure involved in printing the volume of "Proceedings and Transactions" in quarterly parts. In addition to the actual cost of printing separate sections the item of local and foreign postage is very considerable, and this expenditure the Council considers it was justified in not authorising. The whole volume, which is now in the Press, will consequently be published as a single number shortly after the Annual Meeting. The Council has pleasure in stating that the demand for the Society's publications still increases.

Library.

The Society's library has received many important and valuable additions during the Session, of gifts from private donors, as well as of many handsome donations from foreign Governments and kindred institutions. The Council regrets that adequate accommodation is not yet provided for the very valuable library of scientific works in the possession of the Society and feels, moreover, that the want of a proper repository is disadvantageous to the members of the Society and to the public, who are thus deprived of the facility of reference to geographical works of the greatest importance. The Council has

pleasure in again offering the best thanks of the Society to the Trustees of the Queensland Museum for the use of their Library as a meeting room.

Exploration.

In British New Guinea the work of exploration, carried on during the Session under review, was chiefly confined to the western division of the Possession, where our Corresponding Member, the energetic Administrator, has completed the examination of the Papuan Gulf and investigated the claims to priority of the Rev. J. Chalmers and Mr. Bevan to the discovery of the Jubilee, Wickham and Purari rivers. In addition to this work Sir William MacGregor, with the aid of the Dutch officials, has succeeded in fixing a line of demarcation between the territories occupied by Great Britain and the Netherlands.

General.

The movement, in which this Society took an active part, to effect a reform in time measurement, especially by the general adoption of the Hour Zone system, has received a great deal of attention during the Session. At an Intercolonial Conference of surveyors, convened by the Surveyor-General, Mr. A. McDowall, the subject was freely discussed and resolutions in favour of it passed. Subsequently similar action was taken by the Intercolonial Postal Conference that met in Brisbane in the beginning of this year.

During the year the Council received with pleasure an important communication from the Royal Geographical Society of London stating that the Executive of that influential body had resolved to confer upon our members the privileges of attending the meetings and using the library and map rooms of that Society when in London, without incurring additional obligations, and they are, moreover, privileged to purchase the publications of the Home Society at the same price as that charged to Fellows for extra copies. While referring to this important subject the Council begs to remind the members that this Society has for several years been affiliated with the Royal Scottish Geographical Society, whose publicatians may also be obtained on the same terms as those offered by the London Society.

For the Council,

J. P. THOMSON,

Hon. Secretary.

On the motion of Mr. P. McLEAN, seconded by Mr. JOHN FENWICK, the Council's Report and Balance-sheet were adopted.

ANNIVERSARY ADDRESS.

Notes on the Geographical Conditions of the catchment area of the Brisbane River; the floods, and their origin* (*With a Map*).

By the Hon. A. C. GREGORY, C.M.G., M.L.C., F.R.G.S., Etc.
President of the Royal Geographical Society of Australasia, Brisbane.

In a previous paper relative to the recent floods in the Brisbane River I confined my remarks to the question of the frequency and magnitude of floods in the past, and also the probable future recurrence. In continuation of the same general subject, it is now proposed to investigate the conditions of the areas of land included in the watershed, and the relative proportions of the several tributaries contributing to floods; also the character of the country and ranges of hills which may affect both the amount of rainfall and the facilities for its reaching the lower part of the river so as to co-operate at the period of maximum inundation. In collecting data for the subject under consideration I have been largely indebted to Mr. J. P. Thomson's paper on the same subject read before this Society in 1890, and to the especially important map of the Moreton district recently published by the Surveyor-General in illustration of the late inundations. In investigating the geographical conditions of the catchment area of the river Brisbane, its basin may be conveniently divided into two sections—the first including all the affluents above the junction of the Lockyer, and the second the Lockyer and Bremer Rivers. The first section of the watershed covers an area of about seventy miles in length and breadth, including an area of 2,150 square miles, the central parts having an elevation of 100 to 200 feet; the north and west boundaries rising into steep ranges, the summits reaching altitudes from 2,000 to 3,000 feet, and the faces steep and serried by deep

* In delivering his address, Mr. Gregory referred to a large map showing the Catchment area of the Brisbane River, prepared under the direction of Mr. A. McDowall, Surveyor-General of Queensland, who kindly lent it for the occasion.

ravines; the whole densely forested, so that they are admirably calculated to arrest and condense the vapours of those cyclonic winds which are the chief cause of the heavy rains. On the east side the D'Aguilar Range of about 1,000 feet elevation separates the valley of the Brisbane from the sea coast, from which its average distance is only fifteen miles. And this range causes the winds from the ocean to roll over its crest and result in heavy rain falling on its inland slope towards the Brisbane valley. Thus we have a huge basin including an area of 2,150 square miles in which the conditions favourable to excessive rainfall are highly developed. The second section comprises the valleys of the Lockyer and Bremer Rivers, including an area of 2,850 square miles. Their valleys are more level than those at the heads of the Brisbane, and it is only on the west that the abrupt face of the Main Range with an altitude of 2,500 feet presents any important high land tending to an excessive rainfall, while the small grade in the channels of the watercourses and the wide areas of inundation greatly retard the outflow, so that the floods of the Upper Brisbane River have usually commenced to subside before the Bremer and Lockyer have reached their maximum discharge. This variation in the condition of the two divisions of the watershed area of the Brisbane River has proved to be a factor of great importance to the City of Brisbane, as on several occasions of excessive rainfall during short periods the magnitude of the flood has been restrained though the duration has been prolonged proportionately. Thus it is apparent that though the area of the Upper Brisbane valley is less than half of the whole watershed of the river, yet its special features cause it to be the chief source of high floods; and it is therefore desirable to ascertain what amount of rainfall in this district would be sufficient to cause a flood of the magnitude of that in February last. For the purpose of measuring the quantity of water discharged by the river at the time of maximum flood the sections of the river at the Indooroopilly and Victoria Bridges and the observed velocity of current afford valuable data. The observations at the railway bridge at Indooroopilly are the most reliable, as the flood was nearly confined to the site of the bridge, where the rise above tidal high water was 42 feet, giving a sectional area of 51.800 square feet; and at a mean velocity of four-fifths of the

maximum surface current of ten miles per hour, or average of eight miles per hour, equal to 12 feet per second, the discharge was 600,000 cubic feet per second. Now, 1 inch of rain per hour over the 2,150 square miles of the Upper Brisbane valley only is equal to 1,389,000 cubic feet per second, and therefore a continuous rainfall of somewhat less than half-an-inch per hour, or 10·3 inches per day of 24 hours, would be sufficient to maintain the flood at the maximum. If the rainfall were equal over the whole watershed of 5,000 square miles, 1 inch of rain per hour would equal 3,230,000 cubic feet per second, and this is five times the quantity of the flood, and therefore one-fifth of an inch of continuous rain per hour, or 5 inches per day of twenty-four hours, would be equivalent to the flood discharge of the river. The conditions under which the rainfall of 5 inches per diem would cause a flood such as that of February are not likely to often recur, for first the country must be fully saturated by previous long-continued rains so that there would be no absorption by the soil or otherwise and practically in a condition of flood, and that the continuous rainfall of 5 inches per diem should be maintained over the whole area for at least six to eight days, or the alternative that the rainfall in the Upper Brisbane valley should amount to 10 inches per diem for a period of two or four days. So far the conditions of the flow of the river have been computed from data obtained at the Indooroopilly Bridge, but the conclusions are supported by the data supplied by the Victoria Bridge site, where the area of the flood section between the abutments was 51,480 square feet, and the maximum velocity as observed in the Milton Reach, a mile higher up, eight miles per hour, or 12ft. per second; the mean flow being taken at 9·6ft. per second, and the flow of water 494,000 cubic feet per second. This gives about one-fifth less than the Indooroopilly observations, but at the Victoria Bridge a large volume of water was flowing past over the lower parts of South Brisbane, while the portion of the Milton Reach above the bridge, where the speed of the current was measured, is 100ft. wider than at the bridge itself, so that considering the circumstances under which the measurements were taken, the agreement is closer than could have been expected. It may also here be noted that the rise of the flood above the tidal high water at the Victoria

Bridge was 27ft., and at the Indooroopilly Bridge, ten miles above, the flood rose 42ft., and the gradient of the surface between the two bridges 1 in 3,530. Having collected the foregoing data the question arises—Can we apply it in mitigation of the damage caused by these floods? So far as the City of Brisbane is concerned it would be quite practicable to give warning of the existence of conditions necessarily precedent to the commencement of high flood. A record of the rainfall at Woodford, Nanango, Crow's Nest, Toowoomba, and Fassifern would give a good indication of the average on the borders of the watershed, while Ipswich, Mount Brisbane, Laidley, Gatton, and Helidon, would indicate the condition of the central parts, so that whenever the country was fully saturated by previous rain, and the average rainfall has increased to 3in. per diem, warning could be given about two days before the maximum flood reached Brisbane, and thus afford time for removing goods from the lower levels. It has been suggested that the periodical floods might be reduced by the conservation of water in large reservoirs constructed in the upper parts of the tributaries of the Brisbane, and that the rainfall, instead of being allowed to run to waste in disastrous floods, could be stored up and utilised for the irrigation of agricultural lands in the lower parts of the valleys. But however advantageous such a system might appear in theory, it would not be successful in practice, for not only would the interest on the first cost of construction greatly exceed the possible income, but the danger of high floods would not be decreased, because it is indispensable that the reservoirs should be filled at the earliest part of the wet season if they are to be available for irrigation, and it is only in the case of a reservoir being empty that it could hold back any important part of the flood-waters; while the impounding of a large body of water would be a standing menace of danger, as in the case of an embankment failing the results would be disastrous in the extreme. Another suggestion has been to cut a flood channel from the Brisbane River one mile below Oxley Creek across to Norman's Creek, and thus carry the flood past the city. The distance is four and a-half miles and would have to be cut through a high ridge, but taking the average excavation at only 50ft. in depth, 1000ft. wide, and four and a-half miles long, the quantity of earth and rock to be re-

moved would be nearly 45,000,000 of cubic yards, which at only 2s. per cubic yard would cost £2,500,000 exclusive of contingent works and land. Even if the cost did not preclude the adoption of this scheme it would not be effectual because the gradient of the flood surface below the Port Office in Brisbane was only 1ft. 5in. per mile, and the water in the river two miles lower down at Norman's Creek was not 3ft. lower than at the centre of the city, so that even if the whole of the river could have been diverted by the side channel it would only have reduced the flood in the city from 24ft. to 21ft. In conclusion, I must again express my acknowledgments of the valuable data derived from the excellent map with tables and diagrams which has just been published by the Surveyor-General, Mr. McDowall, in illustration of the conditions under which the late floods in the Moreton District occurred, and without which the time at my disposal would have been insufficient for the preparation of this paper.

NOTE.—March, 1890—1½in. rain for seven days; flood 14ft. 3in. 5th February, 1893—3in. rain for eight days; flood 23ft. 10in. 19th February, 1893—3⅓in. rain for four days; flood 23ft. 12th June, 1893—2·1in. rain for four days; flood, 8ft. 3in.

On the motion of Mr. C. B. Lethem, seconded by Capt. J. L. Michael and supported by the Hon. Secretary, a vote of thanks to the President, for his address, was carried by acclamation. On the invitation of the Chairman, Messrs. George Phillips, C.E., M.L.A., and C. L. Wragge, F.R.G.S., offered a few remarks upon the subject of the President's address, both of whom concurred in Mr. Gregory's views.

The ballot for officers and Councillors of the Society for the Session 1893-94, resulted in the unanimous election of the following gentlemen:—President: J. N. Waugh, M.D., etc.; Vice-President: John Fenwick, J.P.; Hon. Treasurer: C. B. Lethem, C.E.; Hon. Secretary: J. P. Thomson, F.R.S.G.S., etc. Members of Council: Hon. A. C. Gregory, C.M.G., M.L.C., F.R.G.S., etc., R. Gailey, J.P., Major A. J. Boyd, Captain T. M. Almond, F.R.A.S., D. S. Thistlethwayte, C.E., A. Gibb Maitland, F.G.S., W. Soutter, C. B. Fletcher, L.S.; Hon. Auditor: Warren Weedon.

Votes of thanks to the retiring officers, to the Hon. Treasurer and to the Hon. Secretary were unanimously carried.

A very cordial vote of thanks to Mr. A. McDowall, the Surveyor-General, for the loan of the map to illustrate the President's address was also accorded.

ROYAL GEOGRAPHICAL SOCIETY OF AUSTRALASIA, BRISBANE.

Abstract of Council Minute, 11th May, 1893:—

The Council, desirous of recognising the services of Mr. J. P. Thomson, the Founder of the Queensland Branch of the Royal Geographical Society of Australasia, and the value of his numerous and various publications, resolve to publish in the "Proceedings and Transactions" of the Society the following revised account of his work from "The Journal of the Manchester Geographical Society, 1891."

A. C. GREGORY, *President.*

Summary of the Geographical Work of Mr. J. P. Thomson, Fellow of the Royal Scottish Geographical Society, etc., Honorary Secretary to the Royal Geographical Society of Australasia, Brisbane.*

During the years 1873 and '74 the subject of this memoir visited New York, travelled through the United States of America and to the province of New Brunswick, where he ascended the Miramichi River. Returning to Scotland for a brief period, Mr. Thomson next voyaged to the West Coast of South America, where he visited Valparaiso, Iquique, Arica, Callao, Lima, and travelled through the other parts of Peru and Chili. Again returning to Scotland he afterwards proceeded to New Zealand and arrived in that colony in 1876. During that year he travelled through the whole of the provinces of New Zealand, and in 1877 voyaged to New South Wales, where two years were spent in travelling through that country and through other parts of the Australian continent. While in New South Wales, Mr. Thomson was for some time engaged

* This is only a brief account of work of a *Geographical character;* and not intended to include anything outside the legitimate field of Geography.

in field survey duties and in contract work in the drafting branch of the Survey Department, Sydney.

In 1879 Mr. Thomson left Sydney intending to enter upon a professional engagement in the Crown colony of Fiji. When passing through New Zealand *en route* to Fiji, Mr. Thomson's services were retained for a short time by the New Zealand Government to assist in some extra computing work in the Survey Office, Christchurch. In the beginning of 1880 he entered the service of the Colonial Government of Fiji, and for five consecutive years he was occupied in conducting field surveys and explorations of the island colony. During that period he surveyed and explored for the first time, assisted by a staff of Government indentured Polynesians, the whole of the north-western, northern and south - east coasts of Vanualevu; the interior of that island; the island of Kadavu; the southern and eastern coasts, and several parts of the interior of Vitilevu, and many smaller islands of the group. He also surveyed and explored the rivers of Rewa, Waidalici, Dreketi, Wailevu, Labasa, Navua, and many other less important streams in various parts of the group. These surveys and explorations, which were officially mapped out, added very largely to our knowledge of the geographical conditions of the Archipelago of Fiji.

While engaged upon these official duties, as Government Surveyor, Mr. Thomson was intrusted with the conduct of the observation of the Transit of Venus, in 1882. In preparing for and carrying out this most important work he received the warm

support of his Excellency the Governor, Sir G. W. Des Vœux, and material assistance from the present Administrator of British New Guinea, Sir W. MacGregor. Mr. Thomson also conducted extensive astronomical observations for latitude and longitude; for magnetic declination, and the observation of eclipses and comets.

After leaving Fiji he visited and travelled through New Caledonia; he also paid a brief visit to New Guinea and several other islands in the South Pacific. He afterwards visited Queensland, and took up his residence in the City of Brisbane, arriving there in the first month of 1885.

During his travels and explorations Mr. Thomson collected many valuable natural history objects as well as ethnological and geological specimens of interest, now in his possession.

In addition to the not inconsiderable services rendered to geographical science by his professional labours and his numerous and various publications, the whole of Mr. Thomson's spare time for the past eight years, after his daily work in the Survey Office, Brisbane, has been devoted to the Queensland Branch of the Royal Geographical Society of Australasia, and to the promotion and encouragement of geographical knowledge.

At the commencement of 1885 Mr. Thomson took active steps to found a branch of the Royal Geographical Society of Australasia in Brisbane, being satisfied that an institution of the kind was necessary in such a vast and important colony as Queensland, with enormously rich resources and lying, moreover, on the borders of New Guinea. It was thus felt

that the existence of a geographical society in Brisbane for the purpose of collating and disseminating geographical knowledge, by publications and lectures, would be advantageous to the public and to the whole colony. From the foundation of the Society to the present time Mr. Thomson has incessantly laboured as its Honorary Secretary and Editor of its literature. For six of these years he also filled the combined offices of Honorary Secretary and Treasurer.

As a representative of the Geographical Societies of Scotland, Manchester, Paris, and Marseille, in the capacity of Honorary Corresponding Member, Mr. Thomson has for several years past contributed to the literature of these institutions many valuable papers upon geographical subjects. In 1888 the Council of the Royal Scottish Geographical Society conferred the Honorary Diploma of Fellowship of that Society upon Mr. Thomson, and shortly afterwards the title of Honorary Corresponding Member was bestowed upon him by the Scientific Society of Mexico, in recognition of his services to scientific geography.

As one of the delegates representing the scientific societies in Australasia Mr. Thomson took an active part in assisting to form the Australasian Association for the Advancement of Science, at a meeting held in Sydney in 1886.

Mr. Thomson is the author of the following publications:—

1. The Late Phenomenon after Sunset.—*Suva Times*, April 23, 1884.
2. Total Eclipse of the Moon, April 10, 1884.– *Ibid.*
3. Sketches on the Rewa River.—*Ibid.*, Oct. 29, 1884.
4. Sketches on the Navua River.—*Ibid.*, Nov. 5, 1884.

5. The Late Hurricane, Fiji.—*Brisbane Daily Telegraph*, Apr. 17, 1886.

6. Comets: Their Orbits, and the method of computing their elements, &c. Read at the February (1887) meeting of the Queensland Branch of the Royal Geographical Society of Australasia.—*Brisbane Courier*, Feb. 8, 1887.

7. Objects of the Geographical Society.—*Proceedings of the Geographical Society of Australasia, Queensland Branch, Vol. I.*, p. 7.

8. Macuata, the North-west Coast of Vanua Levu, Fiji, &c. (with a map).—*Ibid.*, p. 27.

9. The Rewa River, Fiji: Its Tributaries and District (with a map.)—*Ibid.*, Vol. II., part I., p. 29.

10. Report of the meeting of Inter-Colonial Delegates held in Sydney, Nov., 1886.—*Ibid.*, part II., p. 76.

11. Report upon the Preliminary Examination of a Hill of Subsidence in the Redbank Plains District, &c., Queensland.—*Ibid.*, p. 119.

12. The Importance of the Teaching of Geography in the School.—*Ibid.*, Vol. III., part I., p. 38.

13. The Comet.—*Ibid.*, part II., p. 72.

14. Occultation of the Planet Venus by the Moon, March 9, 1888.—*Ibid.* p. 72.

15. His Honour Sir W. MacGregor's Ascent of Mount Victoria, and Exploration of the Owen Stanley Range, British New Guinea (with a map and illustrations.)—*Ibid.*, Vol. V., part I., p. 2.

16. On the Application of Astronomy to Meteorology.—*Ibid.*, part II., p. 58.

17. Notes on the Brisbane River Floods.—*Ibid.*, p. 67.

18. Sir W. MacGregor's Upper Fly River Exploration, British New Guinea.—*Ibid.*, p. 94.

19. The North-east Coast of British New Guinea, and some Adjacent Islands.—*Ibid.*, Vol. VI., part I., p. 32.

20. Universal Time Measurement.—*Ibid.*, Vol. VII., p. 30.

21. Practical Suggestions to Travellers (illustrated).—*Ibid.*, p. 68.

22. The "Melanesian Plateau": Notes on Mr. C. Hedley's Paper.—*Ibid.*, Vol. VIII, p. 17.

23. On British New Guinea.—*The Scottish Geographical Magazine*, Vol. III., page 648.

24. On British New Guinea.—*Ibid.*, vol. IV., p. 334.

25. On New Guinea and Adjacent Islands.—*Ibid.*, p. 495.

26. On New Guinea.—*Ibid.*, p. 613.

27. The Barcaldine Artesian Well, Queensland.—*Ibid.*, p. 333.

28. On New Guinea.—*Ibid.*, Vol. V., p. 271.

29. On New Guinea.—*Ibid.*, p. 557.

30. The Island of Kadavu (with a map).—*Ibid.*, p. 638.

31. Ascent of Mt. Yule.—*Ibid.*, vol. VII., p. 445.

32. A Survey of Exploration in British New Guinea.—*Ibid.*, Vol. VIII., p. 367.

33. The Blackall Artesian Well, Queensland.—*The Journal of the Manchester Geographical Society*, Vol. IV., p. 168.

34. Sir W. MacGregor's Ascent of Mt. Victoria, New Guinea.—*Ibid.*, Vol. VI., p. 184.

35. The Island of Kadavu.—*Ibid.*, p. 194.

36. The North-east Coast of British New Guinea.—*Ibid.*, Vol. VII., p. 57.

37. Practical Suggestions to Travellers (with maps).—*Ibid.*, p. 153.

38. Ascent of Mt. Yule.—*Ibid.*, p. 294.

39. Exploration and Discoveries in British New Guinea.—*Ibid.*, Vol. VIII., p. 42.

40. Nouvelle Guinée.—*Bulletin de la Société de Géographie de Marseille*, tome XII., p. 68.

41. Nouvelle Guinée.—*Ibid.*, p. 70.

42. Nouvelle Guinée.—*Ibid.*, p. 201.

43. Nouvelle Guinée.—*Ibid.*, p. 303.

44. Nouvelle Guinée.—*Ibid.*, tome, XIII., p. 80.

45. Sir W. MacGregor, Nouvelle Guinée.—*Ibid.*, p. 410.

46. Sir W. MacGregor, Nouvelle Guinée.—*Ibid.*, tome XIV., p. 203.

47. M. MacGregor, Nouvelle Guinée.—*Ibid.*, p. 417.

48. Le Mont Yule.—*Ibid.*, tome XV., p. 405.

49. Exploration de la Papouasie Anglaise.—*Bulletin de la Société de Géographie Commerciale de Paris*, tome X., p. 204.

50. Un Nouveau Puits Artesian en Australaise.—*Ibid.*, p. 449.

51. En Nouvelle Guinée.—*Ibid.*, p. 457.

52. Un Exploration de la Nouvelle Guinée Anglaise.—*Ibid.*, p. 656.

53. Nouvelle Guinée, Anglaise et Allemande.—*Ibid.*, tome XI., p. 143.

54. Epilogue du drame de La Pérouse.—*Compte Rendu*: *Société de Geographie de Paris*; Nos. 19 and 20, 1891, p. 580.

55. Rapport Sommaire sur les Voyages et Travaux Géographiques en Australasie (Queensland), au XIXe. Siécle.—*IVe. Congrés International des Sciences Géographiques, tenu a Paris en 1889*, tome II., p. 104.

56. Exploration and Discoveries in British New Guinea.—*Goldthwaite's Geographical Magazine*, Vol. III., p. 368. New York.

57. Practical Suggestions to Travellers (Illustrated).—*The Journal of the Tyneside Geographical Society*, May, 1893, p. 113.

58. Exploration and Discoveries in British New Guinea since the Proclamation of Sovereignty.—*Australasian Association for the Advancement of Science*, Hobart, 1892, Vol. IV., section E., p. 419.

59. Universal Time and the Prime Meridian.—*Read before the Royal Society of Queensland, on Friday, March 13, 1891.*

60 "British New Guinea," with map, numerous illustrations and appendix. *London: George Philip & Son: Brisbane: Muir & Morcom.* Pp. XXVIII x 336. 1892.

Besides these there are several others of earlier date, to which precise reference cannot be conveniently made.

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TO THE

ROYAL GEOGRAPHICAL SOCIETY OF AUSTRALASIA

(QUEENSLAND BRANCH),

From August, 1892, *to August*, 1893.

[The names of the Donors are in *italics*.]

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ANNUAL Reports of the Department of Agriculture for the years 1889-92; also Bulletins Nos. 1, 8, 9, 11, 12, 13, 15, 16, and 24 *From the Under Secretary for Agriculture, Brisbane.*

ANNUAL Report on British New Guinea from 1st July, 1891, to 30th June, 1892; also Handbook of Information for Intending Settlers. *From his Honor Sir W. MacGregor, K.C.M.G.*

ANNUAL Reports of the Department of Mines and Agriculture, New South Wales, for the years 1891-92. *From the Hon. the Minister for Mines.*

ANNUAL Report of the Bureau of Ethnology, 1885-86; Contributions to North American Ethnology, Vol. VII.; Bibliography of the Athapascan Languages. *From the Department of the Interior, U.S.A.*

ANNUARIO del Observatorio Astronómico Nacional de Tacubaya para el Ano de 1893. *From the Observatory.*

ANNUARIO del Observatorio do Rio de Janeiro pava o Anno de 1892; O Clima do Rio de Janeiro. *From the Director of the Observatory.*

ANNALEN des K. K. Naturhistorischen Hofmuseums. Band VI., Nos. 3 and 4; Band VII., Nos. 1-4; Wien, 1891-92. *From the Museum.*

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A PROPOSAL for a Scientific Exploration of the Island of Timor. By Lt.-Colonel Legge, F.Z.S., etc. *From the Author.*

BOLETIM da Sociedade de Geographia de Lisboa. 10A Serie, Nos. 6-11; 11A Serie, Nos. 1-8. *From the Society.*

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BOLETIN de la Sociedad Geográfica de Madrid. Tomo XXXII. Nos. 5-6; Tomo XXXIII. Nos. 1-6; Tomo XXXIV. Nos. 1-3. *From the Society.*

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Boletin del Instituto Geográfica Argentino. Tomo XIII., Nos. 1-9. *From the Institute.*

British New Guinea. By J. P. Thomson, F.R.S.G.S., etc.; with map, numerous illustrations and appendix. London: George Philip & Son; Brisbane: Muir & Morcom. Pp. XXVIII x 336. 1892. *From Messrs. Alex. Muir & Morcom, Brisbane.*

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"Cosmos." Vol. XI., Nos. 2-6, 1892. *From Professor Guido Cora.*

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Fennia, 5, 6, 7, Bulletin de la Société de Géographie de Finlande. *From the Society.*

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From S. P. Smith, Esq., F.R.G.S., Surveyor-General, N.Z.

GEOLOGICAL Observations in British New Guinea in 1891. By A. Gibb Maitland, F.G.S., Assistant Geologist, Geological Survey of Queensland. *From the Author.*

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LE GLOBE, Journal Géographique; Organe de la Société Géographie de Genéve. Tome XXXI., No. 2; Tome XXXII., Nos. 1 and 2.
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MAP showing the Explorations and Discoveries in South Australia and Western Australia made by the Elder Scientific Exploring Expedition, under the auspices of the South Australian and Victorian branches of the Royal Geographical Society of Australasia, 1891-2.
From Sir Thomas Elder, G.C.M.G., etc.

MAP showing the Catchment Areas of the Brisbane River and of the Logan and Albert Rivers, &c., 1893. Printed and published at the Surveyor-General's Office, Brisbane, Queensland.
From A. McDowall, Esq., Surveyor-General.

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From S. P. Smith, Esq., F.R.G.S., Surveyor-General of N.Z.

MEMOIRS and Proceedings of the Manchester Literary and Philosophical Society. Vol. V., No. 2; Vol. VI., No. 1; and Vol. VII., No. 1 Fourth Series. *From the Society.*

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PROCEEDINGS of the Colorado Scientific Society, 1892-93. *From the Society.*

PROCEEDINGS of the Royal Society of Edinburgh. Vol. XVIII., 1890-91. *From the Society.*

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PROCEEDINGS of the American Philosophical Society. Vol. XXX., Nos. 138 and 139. *From the Society*

PROCEEDINGS and Transactions of the Nova Scotian Institute of Science. Seventh Series. Vol. I., Part 1. *From the Institute.*

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REPORT of the Hydraulic Engineer on Water Supply, Queensland. 1892. *From J. B. Henderson, Esq., Government Hydraulic Engineer.*

RESULTS of Rain, River, and Evaporation observations made in New South Wales during 1889, 1890 and 1891; Meteorological observations, 1881-84 and 1888-90; Physical Geography and Climate of New South Wales; Stations determined Astronomically in connection with Trigonometrical Survey of New South Wales; Proposed Method of Recording Variations in the direction of the Vertical; President's

Addresses delivered at the First Meeting of the Australasian Association for the Advancement of Science and at the Annual Meeting of the Royal Society of New South Wales, 1892; Astronomical and Meteorological Workers in New South Wales, 1778 to 1860; Notes upon the Floods in Lake George; Local Variations and Vibrations of the Earth's Surface; the Source of the Underground Water in the Western Districts; Notes on the Rate of Growth of some Australian Trees; Notes upon the History of Floods in the River Darling. By H. C. Russell, C.M.G., etc., Government Astronomer of New South Wales. *From the Author.*

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From the Director of Sydney Observatory.

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GEOGRAPHICAL NOTES.

An Interesting Discovery.—An announcement of unusual interest has just been received at the Smithsonian Institution from Crimea. It comes from the distinguished Russian engineer, Melnikoff, whose fame in his profession is alone sufficient to vouch for its trustworthiness. His letter is the first announcement in this country of an interesting discovery.

The Russian Government a short time ago undertook to survey a route for a canal between the Black Sea and the Sea of Azof. Melnikoff was assigned to this task, and during its performance he discovered the remains of a great ditch of high antiquity, built on marvellous proportions by savage hands, and nearly three thousand years old. Among the great engineering wonders of the world it is second in age only to the great pyramids of Egypt.

For the most part the course of the great excavation through the Crimean plain has been obliterated by the ravages of time, but it can be traced for the distance of six miles. Its discovery explains many historic remains which hitherto could not be accounted for. Search has been made in history for some account of its building, and the Russian concludes it was probably constructed in the seventh century, B.C., by Assande I, of Bosphorous, who was a powerful ruler of those times in that then barbarous country. Nothing is said, however, of the purpose which so great a work, requiring such a vast amount of labor, served. It is also probably referred to by Strabo and Pliny, ancient Roman writers, but in indefinite terms.

The canal excites the interest not so much as the marvellous fortifications which lined its banks and protected its terminals at either sea. It was paved the entire length with stones, through a country where rocks are unknown, and which must have been brought a considerable distance. The

bottom, before the channel was filled with earth as the years passed by, measured about twenty-five feet, and had an average depth below the surrounding surface of twenty to thirty feet.

One would suppose that this great watercourse was a roadway for vessels between the two seas, it being a much shorter route for the crafts of old than sailing around the isthmus; but this is not certain, for the savages who built it were not engaged, so far as is known, in commerce.

At either end were strong castles, which are now in ruins, but it can be remembered when, in this century, parts of them were standing. They are built of stone. During the Crimean war, which began in 1854, a part of these stones were carried away to construct hospitals for the soldiers. The massive remains of these castles now measure over 750,000 cubic metres. Along the banks of the canal extending through the plain was a wall capped with many towers, but hardly a vestige now remains of these. In the centre of the canal—which, except at this point, was as straight as an arrow—there was a huge fortification of four sides, three of which were protected by a canal. At this point there was also a smaller canal, which, situated outside the larger, afforded additional protection.

Xenophon, a famous Athenian who conducted the retreat of the 10,000 Greeks, tells in his History of ditches which were dug across the plains by the enemy, to impede their march through the hostile territory, and sometimes water was let into them by night as a further hindrance. It may be that this curious feat of ancient engineering served as a monstrous wall and moat for protection from enemies. Certainly this was a strategic point.

The remains of the old canal can be traced on the south side of the modern city of Perekop, which is not far from the Greek city of Taphras. This last name, which is of ancient origin, signifies in the Greek language a ditch, and gives an interesting clue. Stones were undoubtedly taken from the bottom of the canal to build the city of Perekop.

The ancient Cimmerians, a savage people, inhabited this region formerly and built this canal. They were without laws or literature, so far as any records of their own come down to us. All travellers who came to them were sacrificed to their heathen gods, and hence it is that the digging of this great ditch, which for its time rivals the Suez canal, is shrouded in deep mystery.—*Goldthwaite's Geographical Magazine, May-June, 1893.*

Cartography in Finland.—The Geographical Society of Finland has lately taken decisive steps for the construction of a reliable map of the country on a sufficiently large scale. A specially appointed Committee has drawn up an elaborate report which is now published in the Society's journal *Fennia* (1892, No. 6). The report gives first a review of the cartographic work hitherto done. The chief material for a map of the country is contained in the parish maps on the scale of 1 : 20,000, which were connected together and reduced into maps of the districts or *hérads* (scale 1 : 100,000). These maps, prepared by the Economical Survey Administration, had, however, no satisfactory relation to astronomically or geometrically determined points, and the next task was to make such determinations. They were made at

sixty-six different stations, and with the aid of the data so acquired an excellent general map was published in 1862-73, on the scale of 1 : 400.000, in thirty sheets. On the other side, the Russian General Staff has made for years past very accurate surveys and levellings in South Finland, various hydrographical maps have been prepared by the Administration of Ways and Communications, and various geodetical and astronomical works, precise levellings, and geological maps have also been completed. All the results so obtained are graphically represented on the maps which accompany the report. The report next discusses the degree of accuracy of these different works. In the general map there are errors of from 1′ to 4′, and occasionally as much as 8′ 20″ in longitude. The distances between separate stations are subject to errors of from 1 to 5·4 per cent. of the distance. The scheme elaborated by the Committee for further work includes, first of all, a good trigonometrical system in addition to the net of the meridian measurement and the one accomplished along the 60th parallel. Two lines of triangulation of first-class triangles crossing Finland from north to south and two lines running west and east are therefore proposed. They must be supported by a number of astronomical determinations, and precise levellings have to be made along all railways. These data will be used for the construction of a fundamental map on the scale of 1 : 20,000, as far at least as 63° N., while the northern parts of Finland may be mapped on a smaller scale. The polyhedric projection is advocated, each sheet of the map covering 6′ of latitude and 12′ of longitude. The appointment of a special Geodetical Committee is insisted upon, all cartographic work to be based in the future on the geodetical net work.—*The Geographical Journal*, *July*, *1893*.

Jadeite and Burmite in Upper Burma.—Amongst the minerals for which Burma has acquired a world-wide fame, says Dr. Fritz Noetling in the *Records of the Geol. Survey of India*, vol. xxvi. part 1, is a beautiful green stone called Jade, or sometimes Noble Serpentine, but determined by Mr. Mallet to be Jadeite. It appears to have been first mentioned in 1837 by Captain Hannay, and a more detailed description was given by Dr. Griffith, who was the first European to visit the mines. These mines lie rather more than 30 miles from Kamaing, and consist of two groups—quarry mines on the top of the hill, near the village of Tawmaw, and river mines in the valley of the Uru, beginning near Sanka village. Tawmaw lies in lat. 25° 44′ N. and long. 96° 14′ E., and Sanka is about 6 miles farther east. The stone is found in connection with, and enclosed in, an eruptive rock closely resembling serpentine, which pierces strata of perhaps Lower, but more probably of Upper, Miocene age. Though of no value in Europe, jadeite fetches a high price among the Burmans and Chinese, who will give as much as 400 or 500 rupees for a small piece big enough to fit into a signet ring. If, then, the mines were properly worked, a large revenue might be derived from them. At present the stone is extracted by a disorderly crowd of Kachins, who break the rock by fire and spoil a great deal of the jadeite. The Kensi Tsawbwa claims the mines as his property and receives a royalty on all jadeite exported, and the difficulty of transferring them to better hands

seems insurmountable. It is quite possible, however, that the stone may be found in other parts of Burma.

Following the suggestion of Dr. Otto Helm of Dantzig, Dr. Noetling has given the name of Burmite to the fossil resin of Burma, hitherto called amber, for it is totally different in chemical composition from any other known fossil resin, especially from that generally known as amber (succinite). This article, also mentioned by Captain Hannay and Dr. Griffith, is found in the Hukong valley, in lat. 26° 15′ and long. 90° 30′. The resin occurs in pockets irregularly distributed in a stratum of blue clay of Tertiary age. It is harder than amber, and is easy to cut and polish, but its colour is inferior to that of amber, and fissures filled with felspar spoil many of the pieces. Consequently, it is being driven out of the market by what is known as Indian, but is really Prussian, amber.—*The Scottish Geographical Magazine, July, 1893.*

Types of Fortification in Africa.—Dr. L. Hosel deals with this subject in a recent number of *Globus* (Vol 63, No. 9). Although some tribes in Africa retire before their foes to inaccessible retreats, as a general rule the inhabitants guard against hostile attacks by defensive measures. These consist (1) in making access to their settlements as difficult as possible; and (2) in surrounding the same by protective ramparts. The forest-clad regions afford the fullest scope for the former method, by concealment and circuitous approaches; barriers, pitfalls and stakes being used to make the approach dangerous to a foe. In open country villages are placed on steep hills, and the entrances are made as low and narrow as possible (*e.g.* Taveta), and closed by wooden doors barred on the inside. Surrounding ramparts may be either walls, palisades, or hedges. The first are seldom of stone (rare instances are mentioned by Barth and others). Clay walls are the rule, and are found chiefly in the northern half of the continent, which has been subject to foreign influence, palisades, etc., taking their place further south. Those of Kuka are 20 feet high, and those of Kano as much as 65 feet. They are sometimes double, and owing to diminution of population and other causes, a smaller space is sometimes (as in the case of the capital of Baghirmi) walled in within the original area, which may have included a wide extent of fields, etc., the outer wall then falling into decay. Several concentric circles are sometimes seen, especially in Upper Guinea, and their protective power is increased by masses of thorns at the top. The palisade may be replaced by barricades of thorns or of living hedges of the same, affording an excellent protection against arrows. Hedges of Euphorbia, whose poisonous juice adds to its effectiveness, are much used in East Africa. —*The Geographieal Jonrnal, July, 1893.*

The new Capital of Brazil.—The new Brazilian Constitution contains a proviso that a territory of 14,400 square kilomètres (about 5,560 square miles) shall be delimited on the highlands of Brazil, and that a new Capital of the Republic shall be founded in it. The astronomer, Senhor L. Cruls, has been commissioned to carry out the survey, and since last autumn has

been engaged in the work, assisted by a large staff. Up to the present, 1,200 miles of routes have been surveyed, the geographical positions of some thirty places determined, and the courses of twenty small streams laid down. The four angular points of the quadrilateral which is to contain the district have been fixed, the town of Goyaz, which is in telegraphic communication with Rio de Janeiro, serving as a basis. Two sides of the quadrilateral will lie along meridians, and the other two on parallels of latitude. Herr Ernst Ule, a naturalist, relates in *Petermann's Mitt.* his journey into this region. Starting from Sao Paolo on June 25th he travelled for two days by rail to the terminus Uberaba, a town of 10,000 inhabitants standing at an elevation of 2,400 feet above sea-level. On June 29th the Commission, consisting of 18 members, set out from Uberaba and marched 300 miles to Meia-Ponte, and thence 125 miles farther to Formosa. The central plateau of Brazil lies at an elevation of 1,650 to 3,400 feet, rising still higher towards the north, the region the Commission has to survey. The country consists of gently undulating tablelands, called here *Chapadoes*, thinly covered with stunted knotty trees, or more frequently with grass and herbs. In the valleys were seen a few woods which had suffered severely from frost. The country is extremely thinly populated, and the people are indolent and poverty-stricken. From Formosa, Herr Ule accompanied a small detachment sent out to survey some plateaus to the north, which were said to be over 6,700 feet high. The route ran along the watershed between the Maranhao and Paraná over plateaus 3,300 to 4,600 feet above sea-level. Crossing the Tocantins, the party entered more mountainous country, and could see in the distance the Serra dos Viadeiros. On the tenth day the goal of the expedition was reached, a little to the south of Cavalcanti, and it was found that the highest *Campos* were only 5,250 above sea-level, while a mountain near the camp was 5,580 feet, and others were estimated at 5,900. Exact observations have shown that the positions of places have been given incorrectly on maps. As regards the Serra dos Pyreneos, which rises above Meia-Ponte, Herr Ule states that it is not 9,800, but only 4,500, feet high. On the return, the party took a more westerly route, crossing the Rio Preto, the Tocantins, and the Bagagem (?), and passing the towns of Sao José and Trahiras, which once derived great wealth from gold and diamond mines, but are now in a state of decay owing to the indolence of the inhabitants.

The climate of this region is on the whole healthy for Europeans, but a capital in such a position cannot be expected to attain any importance, and whether it will ever spring into existence at all may well be doubted.—*The Scottish Geographical Magazine, July, 1893.*

Jamaica.—*The Colonies and India*, April 1st, recapitulates the most interesting particulars communicated in Sir Henry Blake's last official report. The island contains about 2,683,000 acres, of which about 413,000 are flat and the remainder hilly. There are 640,000 acres, or about one-fourth of the whole, under cultivation, but of these 372,000 are merely common pasture. Along the centre of the island run ranges of hills, which attain an

elevation of 1,800 feet in the west and 7,500 feet in the east. There is a great variety of soil and climate, and nearly every tropical product can be grown, as well as many crops of the temperate zone. The northern side of the island, being exposed to the north-east trade-wind, is several degrees cooler than the south, but cool breezes blow all round the coasts. The climate is healthy, though the average death-rate is 22·4 per 1000, for this is due to the mortality among Negro children, which is everywhere greater than among Europeans. The island contains several valuable mineral springs, among which are those at Bath, in St. Thomas-in-the-East, with a temperature of 126° F., and the Milk River Bath, in Clarendon, with a temperature of 92° F. They are very efficacious in cases of gout, rheumatism, etc. The exhibition of 1891 will, it is believed, have a most favourable influence on the industries of the island. Dairy-farming has been started, and has a great field before it, as the annual importation of butter is 720,000 lbs. Pottery works have also been established.—*Ibid.*

The Antarctic Whalers.—The *Balæna* and *Active* returned to Dundee in the beginning of June, well laden with sealskins and oil. The reports promised by the captains and surgeons have not yet reached the Royal Geographical Society of London, but they are expected to be ready for publication in next month's *Journal* (of that Society). Until the full reports reach us it would be inadvisable to give an opinion as to the geographical value of the observations made. The *Balæna* did not apparently cross the Antarctic circle, but the numerous sketches made by Mr. W. G. Burn Murdoch, the artist who accompanied her, will doubtless be a valuable contribution to our knowledge of the scenery of the southern ice. The *Active* appears, from the newspaper reports, to have done a little exploration, and her captain, Mr. Robertson, believes that he discovered new land, to which he has given names, taken mainly from the neighbourhood of Dundee and the owners and managers of the whaling vessels. No positions have as yet been made public. Dr. Donald on the *Active*, and Mr. Bruce, on the *Balæna*, took a number of photographs, and meteorological observations were carried on whenever the captains considered that it would not hinder the primary object of the voyage to permit them. Collections of plants and animals were also made by the surgeons subject to the same restrictions.—*The Geographical Journal, July, 1893.*

PROCEEDINGS AND TRANSACTIONS

OF THE

Queensland Branch

OF THE

ROYAL GEOGRAPHICAL SOCIETY

OF

AUSTRALASIA.

9th SESSION,

1893-94.

EDITED UNDER THE AUTHORITY OF THE COUNCIL OF THE SOCIETY

BY

J. P. THOMSON, F.R.S.G.S., ETC., ETC.

Honorary Secretary; Corresponding Member of the New York Academy of Sciences, etc., etc.

The Authors of Papers are alone responsible for the opinions expressed therein.

VOL. IX.

PRINTED FOR THE ROYAL GEOGRAPHICAL SOCIETY OF AUSTRALASIA, QUEENSLAND.

BY

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1894.

The Royal Geographical Society of Australasia.

QUEENSLAND BRANCH.

Patron:
HIS EXCELLENCY GENERAL SIR H. W. NORMAN, G.C.B., G.C.M.G., C.I.E., F.R.G.S., ETC., ETC.

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(Appointed September 14th).

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(Elected July 12th, 1894).

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Society's Rooms:
WILLIAM STREET, BRISBANE.

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VOL. IX.

SUGGESTION.

Every person desirous of bequeathing to the Society any money is requested to make use of the following

FORM OF BEQUEST.

I give and bequeath to the Honorary Treasurer, for the time being, of the QUEENSLAND BRANCH OF THE ROYAL GEOGRAPHICAL SOCIETY OF AUSTRALASIA, *the sum of*

for

the benefit of the said branch of the Royal Geographical Society of Australasia, to be expended as the Council of the said Society may deem expedient for the promotion of Geographical Science or the purpose of exploration in Australasia.

NOTE.—*The Geographical Journal* is published monthly by the Royal Geographical Society of London; price, 1s. 6d. per copy to Members of the Queensland Branch of the Royal Geographical Society of Australasia. The prices of Supplementary Papers and other publications of the former Society may be obtained on application.

The Scottish Geographical Magazine is published monthly by the Royal Scottish Geographical Society; price, 1s. per copy to Members of the Queensland Branch of the Royal Geographical Society of Australasia.

N.B.—All Donations presented to the Queensland Branch of the Society are acknowledged by letter and in the printed "Proceedings and Transactions."

FIRST ORDINARY MEETING.

Ninth Session.

The first ordinary monthly meeting of the ninth session of the Royal Geographical Society of Australasia, Queensland Branch, was held in the rooms of the Society, old Education Office, William street, Brisbane, on the evening of Thursday, August 31, 1893. The Vice-President, Mr. John Fenwick, J.P., occupied the chair.

Elections:—Hon. Corresponding Members: Sandford Fleming, C.M.G., LL.D., C.E., Ottawa, Canada; Major J. W. Powell, F.R.S.G.S., etc., Washington, U.S.A. Ordinary Members: W. H. Richardson, J. O'Conor and J. V. Jenkins.

The Chairman said that in the absence of the President it devolved upon him to open the new session by extending a very cordial welcome to members, and congratulating them upon the new quarters provided for the Society by the liberality of the Queensland Government. Through the kindness of the Minister for Public Works the Society now enjoyed the privilege of free access to a commodious room for the monthly meetings and accommodation for its very valuable library of books and maps, which would prove of great advantage to members and to the public, who might require reliable information upon geographical subjects. Arrangements would be made to hang the maps on the available wall space. He need scarcely state that to a geographical society maps and diagrams were of as great importance as books, and it was necessary that they should be available at all times to members and to the public, subject to certain conditions. Writing material and the Society's stationery would be kept in the room for the use of members at all times.

The attention of the meeting having been drawn to a memorandum prepared by Sir Thomas McIlwraith, K.C.M.G., Premier and Chief Secretary of Queensland, and addressed to the Governments of the sister colonies, urging the adoption of the hour-zone system of time reckoning for railways and other public purposes, Mr. W. Soutter moved,—"That the

Queensland Branch of the Royal Geographical Society of Australasia, having learnt of the enlightened and progressive step recently taken by the Chief Secretary of Queensland to urge upon the Governments of the sister colonies the adoption of the hour-zone system of time reckoning for public purposes, based upon the common meridian of 150degs., desires to express its very high appreciation of and entire concurrence with that action in the interests of geographical science, and furthermore, that the very cordial support of the Society be given Sir Thomas McIlwraith in his efforts to bring about the proposed reformation in time measurement in Australasia, in common with other enlightened countries of the world." In doing so he said that the Society had taken a very prominent part in advocating the adoption of the hour-zone system in Australasia. It was, indeed, the only scientific institution in Queensland which had publicly brought the matter under the notice of the scientific societies in the Southern world, through the medium of its publications, and the necessary steps had also been taken by the Society to place the subject before the various Governments of the Australasian colonies, and to urge upon them its consideration. He felt sure that the hands of the Chief Secretary would be strengthened by the support of the Society.

Major Boyd, in seconding the motion, said it was only fit and proper that the Society should continue to take an active part in the dicussion of the subject. It was about two years ago that the matter was first brought forward through a very valuable paper contributed by the Hon. Secretary, Mr. J. P. Thomson, which was read at one of the meetings and subsequently published in the Society's Proceedings. A great deal more than that had been done, for Mr. Thomson had communicated with the "father" of the movement in Canada, and obtained all available information concerning the progress of the system in other parts of the world. The Council had likewise supplied a great deal of information bearing upon the subject to the Railway Commissioners and Postmasters-General of this and the sister colonies, as well as to the surveyors' institutions, some time before and on the eve of the Melbourne Conference of Surveyors.

The Hon. Secretary said that there could be no doubt as to the suitableness of the 150th meridian proposed by Sir Thomas

McIlwraith. It was the one recommended by the Washington Conference in 1884 for the eastern portion of Australia, and it had been advocated by one of the past presidents of the Society (Hon. A. C. Gregory). Indeed, it was entirely due to the enlightened and energetic action of Queenslanders that the movement had reached its present progressive stage, and the Chief Secretary was entitled to the cordial support of the Society, and to the hearty thanks of the scientific workers in the colony, for the able way in which he had dealt with the matter.

The motion was supported by the Chairman, and unanimously carried.

On the motion of Mr. C. B. Lethem, seconded by Mr. D. S. Thistlethwayte, it was unanimously resolved to convey the resolution to the sister branches of the Society in Sydney, Melbourne, and Adelaide, and to invite them to co-operate with the Queensland society by urging upon their respective Governments the adoption of the 150th meridian as the basis of the hour-zone system for the eastern portion of Australia and for Tasmania, as suggested by Sir Thomas McIlwraith.

Antarctic Exploration.

The Hon. Secretary read an extract from the Journal of the Royal Geographical Society of London concerning the return of the Antarctic whalers, the *Balæna* and *Active*, both of which reached Dundee in the beginning of June, well laden with sealskins and oil. It seems the *Balæna* did not cross the Antarctic circle, but numerous sketches made by the artist who accompanied her will no doubt be of value in contributing to our present knowledge of the scenery of the southern icefields. It is believed that the exploration done by the *Active* resulted in the discovery of new land, named after places in the neighbourhood of Dundee and the owners and managers of whaling vessels. Numerous photographs were taken and meteorological observations recorded. Collections of plants and animals were also made by the surgeons.

A paper was also read, entitled, "What Science and Commerce may gain from an Antarctic Expedition," by Mr. A. Morton.

The Hon. Secretary stated that the subject of Antarctic exploration had been brought before the meeting by the Council

of the Society in response to a communication received from Baron Sir F. von Mueller, and read at the annual meeting of members. The commercial resources of the Antarctic regions were, he believed, very great, and Baron Mueller thought Australia might join together in aiding far southern sealing and whaling in the season 1893-94 by offering a premium to such northern steamers as could be induced to come so far east as to operate under Australian longitudes. Commerce and trade would be promoted thereby in all these colonies, with a proportionate advantage to the public revenue. After the great success of sealers and whalers under American meridians during 1892-93 it must be felt that the latent Antarctic resources ought also for the benefit of Australia, particularly in these depressed times, to be opened as early as possible, and that offer of a bonus might be brought about by a speedy telegram to owners of whaling steamers soon returning from the Arctic regions. The sister branch of the Society in Melbourne was taking active steps to induce some of the Dundee whaling steamers to visit the Antarctic regions in the interests of Australian trade and commerce. Latest news from Melbourne was encouraging, and he hoped something would be done before the end of the season 1893-94.

Major Boyd addressed the meeting upon the subject of Antarctic exploration, and narrated his experiences on board ship in the South Pacific Ocean. He thought that besides whales and seals a very profitable trade could be done in fishing for sharks for the purpose of procuring their livers and fins. Few people had any idea of the value of these for commercial purposes. He thought the whales were not of the right kind. They were very hard to catch, and quite different from the northern types so eagerly sought after by Arctic whalers.

This concluded the proceedings.

SECOND ORDINARY MEETING.

Ninth Session.

The second ordinary monthly meeting of the ninth session of the Royal Geographical Society of Australasia, Queensland Branch, was held in the rooms of the Society, old Education Office, William street, Brisbane, on the evening of Friday, September 29, 1893. The President, J. N. Waugh, M.D., occupied the chair.

Election.—Ordinary Members: David Hardie, M.D., Hugh Louis Heber Percy, and Ormond C. Smith.

The Hon. Secretary read the following address presented by the Council of the Society to His Excellency General Sir H. W. Norman, after the official announcement of his appointment to the position of Viceroy of India and His Excellency's reply thereto:—

Brisbane, September 15th, 1893.

To His Excellency General Sir Henry Wylie Norman, G.C.B., G.C.M.G., C.I.E., F.R.G.S., etc., Patron and Member of the Queensland Branch of the Royal Geographical Society of Australasia, etc.

Sir,

The Council of the Queensland Branch of the Royal Geographical Society of Australasia, while looking forward to your Excellency's early departure from this Colony with deep feelings of regret, desires to offer its very warm felicitations upon your anticipated assumption of the exalted and responsible office of Viceroy of the Indian Empire, to which Her Majesty the Queen has appointed you.

During your Excellency's residence in this Colony as Her Majesty's representative, this Society has enjoyed an active prosperity under your distinguished patronage, and the keen and warm interest you have evinced in our welfare has been abundantly manifested by your presence at our periodical meetings and by the prominent part your Excellency has always taken in discussing the subjects with which the Society was occupied.

By your Excellency's exemplary and unflagging interest in the cause of Geographical science and by your urbanity and kindly disposition you have stimulated and encouraged us in our endeavours to collate and disseminate reliable information of this large and important territory and adjacent regions. Not only by lending the influence of your high position in furthering our objects as an active member within our own Colony but in advancing our interests in other parts of Australasia, especially by the valuable services your Excellency rendered as our Representative to the Annual Congress of the Australasian Association for the Advancement of Science in 1892.

We are confident that your vice-regal functions in India will be characterised by that mature wisdom, courtesy, and kindliness which have signalised your Excellency's governorship of this Colony, and we, moreover, anticipate that you and Lady Norman will endear yourselves to the people of India as you have likewise done to all classes of our own colonists, and that your memory will be as long cherished by them as by us.

As local representatives of Geographical science, the members of this Council are satisfied that your Excellency, as a valued Fellow of the parent Society at home, will still continue to promote the interests of the Queensland Branch of the Royal Geographical Society of Australasia, and to further the cause of scientific Geography in the great Empire you are about to govern.

On behalf of this Society we cordially join with our fellow-colonists in the hope that your Excellency may enjoy a happy and prosperous career in India and that at some future time we may have conceded to us the privilege of welcoming you, Lady Norman and family to the shores of Queensland.

J. N. WAUGH, *President.*

J. P. THOMSON, *Honorary Secretary.*

Government House, Brisbane,
25th September, 1893.

My dear Doctor Waugh,

Although circumstances changed soon after you and Mr. Thomson presented to me an address from the Queensland Branch of the Royal Geographical Society of Australasia upon my appointment as Viceroy of India and I am not now about to quit Queensland, I feel that some written acknowledgment of the address is due from me.

I request you to inform the Council that I highly value the address and appreciate its kindly language. I cannot deny that from certain points of view I am disappointed at not proceeding to India in the high and responsible position to which I was nominated, but I have a feeling of satisfaction in being allowed to remain here among those from whom I have always experienced kindness and for whom I entertain a most sincere regard.

With every good wish for the prosperity of the Society and for the happiness of its members,

Believe me to be,

Yours very faithfully,

H. W. NORMAN.

Dr. Waugh.

The Hon. Secretary read an abstract of a paper by C. W. Rosset, on "The Wild Peoples of Farther India."

THIRD ORDINARY MEETING.

Ninth Session.

The third ordinary monthly meeting of the ninth session of the Royal Geographical Society of Australasia, Queensland Branch, was held in the rooms of the Society, old Education Office, William street, Brisbane, on the evening of Friday, October 27, 1893. The President, J. N. Waugh, M.D., occupied the chair.

The Hon. Secretary (Mr. J. P. Thomson) read the following paper: –

Notes on "A Governor's Cruise in the West Indies in 1884."

(Being an abridgement of a narrative written by His Excellency General Sir H. W. Norman, G,C.B., G.C.M.G., C.I.E., F.R.G.S., etc.)

To geographers the extensive archipelago of islands contiguous to the eastern shores of Central America and widely scattered over the Caribbean Sea, off the entrance to the Gulf of Mexico, possesses many remarkable features of absorbing interest. Not only because of the political and natural geographical divisions of the numerous clusters that constitute this insular and fragmentary region, no doubt at one time a component part of the great American continent, but also because of its early association with the illustrious name of one of the world's greatest discoverers; an association that will always invest it with historical features which the influence of successive ages of civilization cannot efface.

When in 1892 the large banqueting chambers and science halls of the world were brilliantly illuminated by a galaxy of the intellectual lights of the age in honour of the immortal name of Columbus, it was then the beautiful and fertile islands of the West Indies, with their rich resources, furnished the theme of thought of many thousands of people anxious to do homage to the memory of America's great discoverer.

To Great Britain and Spain this island region possesses many special features of commercial and political importance.

Sugar, molasses, and rum contribute largely to the public revenue of the British Possession, while a great variety of luscious fruits and valuable spices are also made available for export to outside European countries.

Within a region composed of so many fragmentary pieces it is probably not surprising that there are several isolated islands within the British sphere of influence but seldom visited and of which our knowledge is somewhat deficient. This is notably the case with the Cayman, the Turk's, and Keys, of which it is proposed to give a brief sketch in these hurriedly written notes of "A Governor's Cruise in the West Indies in 1884," by General Sir H. W. Norman, our deeply respected Patron, to whom I am indebted for the whole of this valuable information.

In the beginning of 1884 and shortly after assuming the Governorship of Jamaica, His Excellency Sir H. W. Norman started on a cruise to the outlying parts of the British Possession. For that purpose the *Griffon*, a man-of-war, was provided, and on the 12th March a start was made for Georgetown, the principal place in the Grand Cayman. This is an island about 22 miles long and 5 miles wide. By a census taken in 1881 it was peopled by 3,056 inhabitants: of these 864 were white, 1,230 coloured, and 972 black.

From the Central American coast the Grand Cayman is separated by about 300 miles, and it lies W.N.W. some 180 miles from South Negril Point, Jamaica.

As far back as the year 1670 the Cayman Islands were recognised by Spain as British possessions, although an official of the Government never seems to have resided there. Concerning the early history of these island dwellers it is believed their ancestors were buccaneers and some of Cromwell's soldiers, who captured Jamaica, and subsequently settled in the Caymans; probably at a later period these were added to by other people from Jamaica, who were accompanied by slaves, and thus the ancestors of the black inhabitants are easily traced. Although early associated with the practices of pirates and of wreckers the Cayman Islanders now seem a peaceable, well-conducted, hardy, industrious people. They are inoffensive, but quite ready to defend their island homes against enemies or plunderers. Formerly they had batteries erected in suitable places, and even now the

ruins of Charles Fort, at Georgetown, with its old dismounted cannon, bear silent evidence of the social conditions of the early inhabitants. Besides Georgetown there are several so-called towns or villages and two or three schools, but the educational arrangements outside the principal village are rather primitive. The presence of a magistrate or commissioner would no doubt be of very great service to the islanders, but the revenue raised is not large enough to pay an adequate salary to such an officer, and the absence of regular communication with Jamaica makes it difficult for an official residing there to control public affairs in the Caymans.

By an Act of the Imperial Parliament of 1863 all laws previously passed by the magistrates of the Grand Cayman, or by the Vestry, are made valid as soon as the Governor of Jamaica may signify his approval of them. This Act also authorises the Legislature of Jamaica to empower the Justices and Vestry of the Grand Cayman to make laws and regulations under certain restrictions, such laws and regulations not to take effect until they have received the approval of the Government of Jamaica. By this Act the Supreme Court of Jamaica may hear appeals and try cases not lawfully triable in the Caymans.

While on shore at Georgetown His Excellency visited and inspected the school-house, the church, the court-house and offices; the Prison was also looked into. He also had an opportunity of seeing four or five schooners in course of building. These were well-built vessels of from 50 to 90 tons with a beam equal to about a third of the length and shallow compared with the modern vessels built at home. Afterwards His Excellency was taken to several private houses to see the ladies. The houses were very comfortable, fairly furnished and with wall decorations of some extraordinary looking paintings and engravings. Some of the ladies were too bashful to receive His Excellency and made excuses of ill-health although he was taken to their houses by their husbands. At other dwellings a cordial welcome was extended by the fair sex, and those seen were certainly very fine tall women, but without much conversational power. His Excellency next visited a phosphate deposit, the property of a Mr. Powter, who was sanguine of the success of the enterprise. The remainder of the time was profitably occupied in examining the public accounts, the stores and court house.

The *Griffon* next proceeded to Little Cayman, the one side of which is raised above the sea to a higher elevation than the Grand Cayman. From the anchorage to the south of the south-west point of the island no houses were seen, but near a coral reef to the eastward a canoe was observed, the occupants of which were engaged fishing. About mid-day His Excellency started in the ship's galley for the shore, where a landing was effected near the only village on the island. Here the houses were visited and medical comforts supplied by the ship's doctor to those in need of them. The island dwellers here are only thirty-five in number, all pale-faces and the products of two families, designated by the very old and common names of Boddens and Scotts. As there were at least three generations of each family, there were several houses—those of each family being in a group together, and there did not seem much cordiality between the two. "It is a remarkable fact," His Excellency remarks, "that the white people in the Caymans, whose ancestors settled there two hundred years ago, have not degenerated, though intermarriages between cousins are the rule, and the heat is great. The men, however, lead a hardy out-door life. A large proportion of the people bear the same surnames, Bodden, Scott, and Ebank. At one school which I visited 21 out of 50 pupils bore the same name and no doubt were all cousins in different degrees." This was at the time of His Excellency's subsequent visit to the Caymans in 1888, when several very interesting interviews with the people took place ; at the same time it was found that various kinds of improvements were in progress.

Little Cayman is an island of about 10½ miles in length and 1½ broad. It possesses no ship-building industry, as in the Grand Cayman, and the people lead a very lonely life, but are strong and healthy.

Continuing her cruise the *Griffon* next called at Cayman Brac, which is separated from Little Cayman by an open channel some seven miles wide. The anchor was cast at a place called Scott's Village, where His Excellency with several of the ship's officers, landed, after some considerable trouble, owing to the heavy swell that dashed against the rocky shore. The party visited several houses, where the people appeared as strong and healthy as those inhabiting the other islands of the group. The

women, however, looked dull; they were evidently in sympathy with their dreary surroundings. The men were much brighter than the women, for they often go to sea and visit places far beyond their island homes.

Schooners and other vessels of small tonnage are built at Cayman Brac, but the dangerous anchorage is a drawback to the settlement, for vessels having to remain at the place any length of time are compelled to run across to the Little Cayman and anchor near a coral reef at the east end of that island. Although somewhat stunted, the cocoanut palms were here fruitful and abundant.

It was found that practically there is but little communication between Cayman Brac and the Grand Cayman, and although constitutionally one settlement they prefer to be independent of each other; consequently the people of Cayman Brac expend their small revenue upon local improvements instead of accounting for it to the Grand Cayman. The island possesses no school and no place of worship. Sugar-cane and the ordinary ground provisions are cultivated here, but, saving an occasional visit by one of the local schooners to Montego Bay, in Jamaica, this island seems almost shut out from the world. The population of Cayman Brac consists of about 300 whites and 30 blacks. No doubt the latter are descendants of slaves brought over by early settlers. They live apart from the whites, but there is apparently no ill-feeling between the two races.

From Cayman Brac the *Griffon* sailed for Turk's Island. Owing to a strong head wind and heavy sea, advantage was taken of the high lands of Cuba, where shelter was found by running close along the south side of that island. As the ship was making slow progress it was decided to call in at Santiago de Cuba, where His Excellency General Norman had an opportunity of inspecting that old Spanish town, said to be the most unhealthy place in Cuba. The population of Santiago numbers about 40,000 persons. After a somewhat uneventful voyage the *Griffon* anchored off Grand Turk, where the party landed. The town on this island is neat and clean and there was no appearance of poverty about the place, although the inhabitants complained of depression and ruin. Several consuls' flags were flying and there were various stores, besides a good market-

place. The people were frank and outspoken, with much to like in them. Here His Excellency had an interview with the principal people, who were anxious to express their views upon all local matters in which they were concerned. The jail, school-house and court-house were inspected and a visit paid to the Salt Ponds, the new cemetery, and the large tank, where rain-water is collected and retailed for the use of the public. Cockburn Harbour, in the Southern Caicos Island was the next place His Excellency visited. Here local matters were also attended to and several places of interest inspected. The town had a very neglected appearance. Before leaving for Inagua the *Griffon* called at Salt Cay where the Salt Ponds and sea-wall were inspected and the wants of the people inquired into.

These island groups are under the control of a Commissioner, whose residence is at Grand Turk, where a judge is also located. Besides these there is an Assistant Commissioner at Salt Cay and one at Cockburn Harbour for the Caicos Islands. In 1881 the population of Turk's Island consisted of 408 whites, 622 coloured persons and 1,049 negroes; at Salt Cay 46 whites, 230 coloured people and 245 blacks. In the Caicos Islands there were 49 white, 271 coloured and 1,812 black people. The Anglican, Wesleyan, and Baptist churches are established at Grand Turk, Salt Cay, South Providence, South and Grand Caicos. The regular representatives of each denomination are stationed at Grand Turk: of schools there are several, and the State schools are supported by an annual public grant of about £500; no portion of this, however, goes to denominational schools, at which the Nonconformists feel aggrieved. In 1883, the whole revenue of Turk's and Caicos islands amounted to £7,781. A large proportion of this was derived from import duties, royalty on salt, and light dues, payable on account of the lighthouse on Turk's Island. This light is of great service to the 1,500 or so vessels that annually pass through the Turk's Island passage. A royalty is also charged on cave earth deposits. In 1883 this amounted to £238 as against £48 in 1882. Unlike several other British possessions, expenditure is covered by income and a small sum is actually invested in England as a reserve. On Turk's Island there is an old established and well conducted weekly newspaper called the

Royal Standard. The colony also possesses its own postage stamps. Prior to 1880 the Turk's and Caicos islands were under the Bahamas Government ; now, they are a dependency of Jamaica, although the revenue and expenditure of both places are kept entirely separate. The only connection between Jamaica and Turk's Island exists in the supervising power of the Governor of the former, through whom the despatches of the Commissioner are sent to the Colonial Office and whose assent is necessary to ordinances of the Legislative Board. Laws applying to the Turk's and Caicos islands may also be enacted by the Legislature of Jamaica.

Excepting rain-water there is no natural drinking water fit for human consumption in Turk's Island. Whilst an adequate rainfall is, therefore, essential to the life of the people, heavy rains at certain seasons are inimical to their prosperity. Salt is the only industry and this is destroyed by an abnormal precipitation of rain. At the time of Sir Henry Norman's visit, six cents a bushel was the price given for 3000 bushels of salt shipped at Salt Cay. In 1883 1,705,000 bushels of salt were exported; this was valued at about £25,000. In addition to salt, cave earth was exported valued at £6,265.

Cockburn Harbour in the Caicos Islands is simply a barren-looking place for making and shipping salt, but there are other portions of this group clothed with vegetation and apparently suitable for the cultivation of sugar cane, vegetables. and fruit. There is also a supply of cave earth deposit and sponge. The population is chiefly composed of negroes, principally descendants of slaves brought over by loyalist refugees from Georgia, after the declaration of independence of the United States of America. These settlers constructed substantial stone houses and made roads—traces of these still remain. They raised crops and had horses and cattle, but the settlers themselves have long since disappeared. It is generally believed that their crops were destroyed by insects and being discouraged by the loss they left the place. The islands became overgrown with bush, and the remainder of the settlers lapsed into desultory habits little short of savagery. Of late years efforts have been made to improve the condition of the inhabitants by encouraging them to undertake agricultural operations and other industrial pursuits in a

regular manner. Education is still, however, in a very backward state, but it is hoped that sustained efforts will eventually succeed in raising the social standard.

Before returning to Jamaica the *Griffon* called at Matthew Town, and here His Excellency had an opportunity of inspecting the extensive salt ponds and seeing some of the wild ponies that had previously been captured. In the interior of the island of Inagua there are wild ponies and cattle, and large numbers of flamingoes are met with. The island is the largest and most southerly of the Bahama Group, its length being 50 miles and greatest breadth 25 miles. The inhabitants number about 1,100. After an absence of sixteen days the *Griffon* reached Kingston, where His Excellency landed after a most pleasant and enjoyable cruise among some of the least-known island groups of the West Indies. When at Grand Cayman, Sir Henry Norman was presented with an address by the inhabitants, who expressed great pleasure at His Excellency's visit and their high appreciation of the kindness he had shown them.

J. P. THOMSON.

The paper was illustrated by maps, photographs, oil and water paintings, the property of His Excellency General Sir H. W. Norman, who kindly lent them for the occasion.

Cordial votes of thanks were passed to His Excellency the Governor for the use of the illustrations, and to Mr. D. S. Thistlethwayte for having prepared one of the maps.

FOURTH ORDINARY MEETING.

NINTH SESSION.

THE fourth ordinary monthly meeting of the ninth session of the Royal Geographical Society of Australasia, Queensland Branch, was held in the rooms of the Society, old Education Office, William street, Brisbane, on the evening of Friday, November 24, 1893. The President, J. N. WAUGH, M.D., occupied the chair.

A letter was read from His Excellency General Sir H. W. Norman, regretting that a prior engagement prevented him from attending the meeting.

The Hon. Secretary laid upon the table a manuscript Catalogue of the scientific and other books in the library of the Society, prepared by Major A. J. Boyd.

For his valuable services in preparing the catalogue Major Boyd was accorded a very hearty vote of thanks.

The author read the following paper :—

The Chillagoe Caves.

By D. S. THISTLETHWAYTE, C.E.

This paper, which with your permission I purpose reading, is the result of a visit I paid to the Chillagoe Caves in the early part of the present year : and although I do not claim for it any pretentions to scientific research—for it is simply in main the record of a journey more or less of a holiday nature, still, if I can enlist your sympathies and interest in these wonderful productions of Nature, with a view to their preservation to the people of the colony, and their better conservancy from ruthless destruction at the hands of thoughtless and ignorant visitors, I shall indeed be more than gratified.

Fortunately the Caves, being as yet somewhat out of the beaten track, have not up to the present time suffered much mutilation ; still I noticed more than one crude hieroglyphic on

the walls informing one that Bill Smith or Tom Jones had been there on such a date, and again when speaking to a person in Cairns about the Caves, he told me that he had not been there himself, but that he had "a whole bag full of those hanging things—as he termed stalactites—in his back yard given him by someone who had." So you see the spirit of Vandalism is in the neighbourhood: it is to be hoped it will not be allowed to run wild.

As we all know, the United States Government is very much alive to the necessity of preserving for its citizens the natural wonders of the country; and in setting apart and maintaining that large and interesting reservation in the Yellowstone country, known as the "National Park," it has a marvellous possession unsurpassed by any in the known world. Nearer home, our neighbours of New South Wales have reserved to the people, the Fish River and other caves; and I *do* think it would be a matter deeply to be regretted if the marvels of Chillagoe were allowed to fall into private hands, or to suffer destruction from want of a little care and attention. I was informed at the office of the Surveyor-General, that two areas, respectively of two and six square miles including the Caves, have been temporarily reserved by the Government, and in fact when at Chillagoe I saw a printed calico notice warning the public against mutilating the place, but these soon succumb to wind and damp, and become detached from their fastenings; so that in the absence of a custodian being appointed, about which at the present time I recognise some difficulty, I would suggest that painted notice boards be fixed at the entrance to two or three of the principal caves, requesting the public to spare and protect their own property. This might possibly for the present answer the purpose.

Perhaps the most convenient way for the visitor to reach Chillagoe from Cairns is to take the train to Mareeba—the present terminus of the Cairns-Herberton Railway—a distance of 47 miles and at an elevation of 1,325 feet above sea level, and thence he must ride or drive the remaining portion of the journey, a further distance of about 90 miles.

Our party consisted of five, a friend and myself, Mr. Handley of the firm of Handley & Atkinson, of Cairns, Sam, the driver of our pair-horse American waggon, and a man with a pair of

spare horses. Mr. Handley took the admirable photographs I have the pleasure of exhibiting; but not quite all the photographs, for on calling on my friend, our worthy Secretary, Mr. Thomson, to-day, he informed me that His Excellency the Governor, with that forethought and kindliness of which we have so many and frequent examples, had sent to his care some of his own photos to help illustrate this paper.

There is nothing especially worthy of mention on the road, or rather, bush-track; the usual steep approaches into creek and river beds, notably the crossings of the Walsh River and two very steep and terribly rough ascents to be surmounted, respectively named by some early traveller with a touch of grim humor, the "Straw Bed" and "Feather Bed." Another feature to be noticed is the numberless ant-hills; these, on the early stages of the journey, attain a height of from 5 to 8 feet, are rounded off in most cases, and most singularly assume the form of elephants browsing. As Chillagoe is approached they completely alter in shape and become slender, pointed and spire-like.

Two miles in a southerly direction from Wade's accommodation-house, at the crossing of Oakey Creek, there is a most interesting natural soda spring. We took advantage of the mid-day halt to rest the horses at Wade's to strike across the "bush" and visit it. The site is a bar of rock crossing Sandy Creek, and in the centre of a dome-shaped piece about four feet high there is a round hole five inches in diameter and of the same depth; at the bottom of this natural cup there is a small aperture through which the soda water bubbles up. It is brisk, highly charged with gas, and the day being exceedingly hot, we drank freely of it, not, however, without some trepidation as to the result; no ill-effects, however, ensued. With the aid of a vessel we emptied the little well, and found that it just took thirty-five seconds to refill itself.

The small mining township of Kaboora, nestling amongst the ranges, was passed through, where we noticed only a very few miners sluicing for tin, the mines themselves being apparently "hung up."

It is not until the junction of the Muldiva and Chillagoe roads is passed, about four miles from the former place, that the lime-

stone is first met with, and then the track passes over level flats of it. As you approach nearer to Chillagoe Station, or about nine or ten miles from it, the limestone rises upwards from the surrounding flats into bold bluffs and ranges from 100 to, say, 400 feet in height.

These bluffs vary from isolated masses of a few hundred yards in length and breadth, to rugged and wild ranges running for some miles in length by half a mile or so in width.

The appearance of these limestone bluffs is eminently wild and picturesque, for rearing up as they do from the surrounding country, sometimes in perpendicular walls, at other times from a talus of fallen boulders, their summits are highly weathered into the form of pinnacles and spires, with their sides deeply fluted, or into overhanging masses causing one to wonder how they remain in position; such for instance as those known by the names of "Lizard's Head" and "Hanging Rock," the visitor might well imagine them to be the ruins of some mighty castle or stronghold of feudal times. Many of these have typical names, such as the "Tower of London," &c.

The flutings referred to, caused by the weathering of the impure stone from the purer and harder limestone, are so close together that the intervening edges are exceedingly sharp, and care must be taken when clambering about not to slip, as the result might be a serious wound.

In colour the limestone is generally of a blue-grey, in fact very much the colour of the ordinary school slate, and although this adds to the sombre and impressive appearance of these bluffs it causes their outlines to stand out sharp and clear against the azure of the sky, and makes, too, a striking contrast to the green of the vegetation which more or less covers their bases or takes root amongst the crevices and detached boulders on their sides.

The intervening country is park-like, being sparsely timbered with gum, ironbark, bloodwood, and Moreton Bay ash, with ti-tree in the creeks; while on the ranges may be seen the fig-tree, bottle-tree, myrtle, and other less remarkable shrubs. On arrival at Chillagoe Creek, we selected a convenient place for our camp, and, after a mid-day meal, provided with candles and magnesium wire, started to explore the Caves.

The first we visited have been named Herculaneum and Pompeii ; they are distant about one mile in an easterly direction from the crossing of the Hillmanton track over Chillagoe Creek.

The entrance to Herculaneum is gained by climbing up the talus of broken boulders and debris attaining a height of about 40 feet above the level of the surrounding country. It is formed by a fissure in the rock face of about eight feet in height and 18 inches in width ; but immediately within, and at a distance of a yard or two from the opening there is a sudden drop of about 12 feet—provided for by a rough ladder placed there by the owner of Chillagoe Station, and then a steep decline leads to the true floor of the Cave. In no case do the floors of the Caves themselves appear to sink below the general level of the country outside.

The Caves have been formed by the continuous abstraction of the lime in a state of solution by the action of water, the water finding its way through joints and fissures in the limestone, and enlarging them into chambers of various dimensions or into lesser passages forming the connections between. Some of these passages are wide and lofty, extending from the floor level upwards for 60 feet or more ; while others again are so low that you are compelled to crawl on hands and knees, and even to extend yourself flat and wriggle through as best you can.

One of the largest chambers of Herculaneum, the Cathedral Cave, is very beautiful ; it is about two chains or so from the main entrance, and approached by a fairly wide and lofty passage. It is an irregular circle in form of about 50 feet in diameter, and in height probably 60 feet. On one side there is a large stalagmite of pure whiteness, rising up from the floor for about eight feet, called the Font ; while surrounding the top and from it a delicate fringe of stalactites depends. Immediately behind this is a recess which might well be termed the Chancel, flanked on either side by two huge stalactites, which have made a junction with their corresponding stalagmites and thus formed true columns. Numerous stalactites hang from the roof, and the beauty of the scene when lighted up by our magnesium wire was something to be remembered, and in the deep stillness of the cave we could not fail to be impressed with a certain feeling of reverence and wonderment.

The Caves are in many cases rich in ornamentation, the walls, roofs, and floors all presenting some peculiar feature of their own. This ornamentation takes the form of stalactites and stalagmites of all sizes. The former are single and sharply pointed, or again in clusters. Another form of ornamentation is that known as "Drapes," from its resemblance to a fold of drapery. These depend from the roof somewhat in the shape of laurel leaves, 10 to 20 feet long by 12 to 30 inches wide, and a thickness of from half inch to two inches; they ring with a clear musical note when tapped with the knuckles. In many cases the walls and roofs are covered with a secondary deposit resembling the finest coral—it has been aptly termed "Coralline"—in some cases it has become hardened and brittle, but in others it crumbles away with the slightest touch.

As a rule the Caves were perfectly dry, only a small pool of the clearest water being occasionally met with and sometimes a slight dripping from the roof. The atmosphere too was pleasant, and in many of the galleries a strong current of air circulating. The floors are in some places covered with a cement-like deposit of particles of limestone, at others by ordinary cave earth generally of a reddish-brown colour, in which we noticed innumerable small snail shells. We did not see any very great number of bats.

In general, the colouring in the caves where the chambers are in darkness, is white and grey, with sometimes stains of a rich brown, and the sparkling whiteness of the ornamentation has a most charming effect. In other cases where a portion of the roof of the cave has collapsed and allowed partial daylight to penetrate, the colouring is particularly rich and varied, and includes delicate tones of French greys, purples, chromes both red and orange, browns and greens. This is very noticeable in the large chamber of the Royal Arch Cave, where the colouring is so brilliant that the effect is quite startling.

The Royal Arch Cave is about 2½ miles in a south-westerly direction from Chillagoe Station. The entrance is an arch of about 20 feet in height, and 40 feet perhaps above the ordinary level of the surrounding country; and is approached by a climb up the ragged and broken boulders forming the talus: immediately on entering a steep descent is made, and by a series of more or less narrow and winding passages, the larger chamber

is reached. I wish I could convey to you some idea of the beauties of this chamber, Nature's handiwork, with its rich and diverse colouring, its many and varied ornamentations. Stalactites, stalagmites, drapes, and many other fantastic forms, all are here ; but most beautiful of all, perhaps, are certain recesses in the walls, one above the other, forming grottoes as it were ; with the most delicate tracery of stalactites depending from their roofs, and resembling—what shall I liken them too ?—tasselled canopies, or petrified cascades.

Probably there are many caves not yet discovered, for the surrounding bluffs appear to be riddled with cavities, many of which would be difficult of access ; but enough perhaps has been said to give you some slight conception of this most interesting locality. Nor must I risk further trespassing on your attention. I may, however, mention in reference to the exhibit of photographs, that those taken of the interior of the "Royal Arch" in dim daylight were exposed 30, 35, and 45 minutes variously, none less than 30 minutes, yet a figure to show proportionate heights is given in each. The photographs of interiors in utter darkness were produced by the aid of magnesium light.

To any one desiring further information on the subject of this paper, I would refer them to the admirable report furnished by W. Thompson, Esq., F.G.S., late Government Mineralogical Lecturer to the Department of Mines, and to which by the courtesy of that Department he would have access.

In conclusion, I would add that something of marvel and much of beauty must be experienced by the most casual visitor to these caves ; there is more than enough to repay him for any personal inconvenience or discomfort he may have undergone in reaching them.

The paper was illustrated by some beautiful photographs the property of Mr. Thistlethwayte and by several framed pictures of cave scenery belonging to His Excellency the Governor, who kindly lent them for the occasion.

FIFTH ORDINARY MEETING.

Ninth Session.

The fifth ordinary monthly meeting of the ninth session of the Royal Geographical Society of Australasia, Queensland Branch, was held in the rooms of the Society, old Education Office, William street, Brisbane, on the evening of Friday, April 27, 1894. The President, J. N. Waugh, M.D., occupied the chair, and there was a large attendance of members and their friends, including several ladies.

A letter was read from His Excellency General Sir H. W. Norman, regretting his inability to attend the meeting.

The author read the following paper:—

Viti.*

By J. P. Thomson, F.R.S.G.S., etc.

Hon. Secretary to the Royal Geographical Society of Australasia, Brisbane.

The position of the archipelago of the Crown Colony of Fiji is do doubt known to most of my readers, but, nevertheless, it may not be considered amiss at the outset to make some slight allusion to the more remarkable features of its geographical position.

Entirely encircled by the great Equatorial Drift-current and its offshoots, the Fiji Islands lie 1,172 miles almost due north from Auckland in New Zealand, and due east from Halifax Bay on the coast of Queensland. North-east of them are situated the Samoa or Navigator Islands: to the south-east the Friendly or Tonga Islands; to the south-west the Loyalty Islands and New Caledonia: and west of them lie the New Hebrides. The whole group extends from about 15½ degs. to 21½ degs. south latitude: on the east it is bounded by the 178th meridian of west longitude, and on the west by the meridian of 176 degs.

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* Read at the Adelaide Meeting of the Australasian Association for the Advancement of Science, September, 1893; published in The Scottish Geographical Magazine for March, 1894; now revised and added to.

50 mins. east longitude; thus the anti-prime meridian passes right through the Colony. From Sydney the distance to Suva, the capital of the group, is about 1,800 miles, and from Melbourne the same place is separated by some 2,222 miles of ocean highway. Although scattered over some 139,000 square miles* of the South Pacific, within the great Polynesian division of Oceania, the actual land area of Fiji is probably little more than 7,451 square miles.

Regarding the early history of this prosperous British Colony little definite information can be gathered from our stock of modern literature. Since about the middle of this century several interesting narratives of the group and its people have emanated from the pens of various estimable writers, including the admirable work published in 1858 by the Rev. Thomas Williams, of Adelaide, who for many years laboured in Fiji as a Wesleyan Missionary, and who was, moreover, a careful and intelligent observer. In none of these works, however, are we able to find anything more than a passing allusion to the prehistoric age of the land of Viti and its interesting race. To this fascinating subject our attention has recently been invited by Mr. Chas. Hedley, F.L.S., of the Australian Museum. Through the medium of a paper contributed to the Linnean Society of New South Wales† Mr. Hedley, in dealing with the geographical distribution of the molluscan fauna of the South Pacific, points out that the range of the genus *Placostylus* unmistakably denotes the early continental character of Fiji and other neighbouring groups—that in fact New Zealand, New Caledonia, Samoa and Fiji are fragments of what was formerly a continent.

In a few notes upon Mr. Hedley's paper, contributed to the Queensland Branch of the Royal Geographical Society of Australasia,‡ I pointed out that to this extensive area designated the "Melanesian Plateau," and which was probably united during the Mesozoic era, should be added, at least, Australia and New Guinea. This opinion is in harmony with the views expressed

*An error has obviously been committed by the Rev. Thomas Williams, who states that the group extends "over about 40,000 square miles of the South Pacific."—*Fiji and the Fijians*, 2nd Edition, Revised, page 1.

†"The Range of Placostylus: A Study in Ancient Geography," by C. Hedley, F.L.S., Vol. VII. (Series 2nd) of the Proceedings of the Linnean Society of New South Wales, page 335.

‡"The Melanesian Plateau: Notes on Mr. C. Hedley's paper," by J. P. Thomson, F.R.S.G.S., Proceedings and Transactions of the Queensland Branch of the Royal Geographical Society of Australasia, Vol. VIII.

by Professor Geikie, Wallace, De Vis, Maitland and by other well-known authorities.

If it be admitted that these views are borne out by the broad geological and palæontological features of these regions, then our investigations concerning the origin of the Fijians and other peoples of Polynesia will, I submit, be greatly simplified and all doubt concerning the early movements of these island-dwellers set at rest.

That an enormous area of Oceania was formerly occupied by an extensive continental region, of which the numerous islets and groups of islands now separated and scattered about in all directions formed prominent and conspicuous features, seems unquestionable. Still less reason is there to suppose that the now extinct faunas of these regions were at any period of the world's history separated by such clearly-defined lines of demarcation as would adequately and effectually create an insuperable barrier and form distinct zoological provinces corresponding with the positions these widely-scattered fragments now occupy.

Concerning the causes that combined and operated to insulate these regions we can only indulge in vague conjecture, probably of the most extravagant kind. Even now there are abundant evidence of subterranean convulsions, that have not yet ceased, in many isolated parts; but whether these are simply traces or after-effects of the forces that brought about these apparent changes in the physical features of this distorted Oceanic division we cannot at present definitely decide. We shall probably be near the truth in saying that the process of disintegration occurred during the Paleozoic period when the maximum intensity of forces were in operation.

Date of Discovery.—Fiji was discovered in 1643 by the celebrated Dutch navigator, Abel Jansen Tasman, and was subsequently sighted by Captain Cook in 1776; by Captain Bligh in 1789 and 1792; and by Captain Wilson in the *Duff* in 1796—the two latter having passed through the group. There is little doubt, however, that at a period antedating the voyages of our earliest European navigators to these seas, this archipelago was not an unknown region to the Phœnician sailors who voyaged across the Indian and South Pacific Oceans to the shores of the great American continent. But it was not till the beginning

of this century that the natural productions of *beche-de-mer* and sandalwood attracted adventurous traders to the coral girt islands of Viti. About the same time the group was visited by a batch of notorious convicts who, having escaped from the penal establishment in New South Wales, settled themselves among the Fijians. From the year 1804 till 1840, when only one out of the original number of 27 was left, the demoralising influence of these desperate outlaws produced most baneful effects upon the natives of Bau and Rewa. The social habits of these refugees were low and brutal, and in tribal warfare they incited and aided the natives to wanton acts of barbarism and cruelty. This indeed was the deplorable conditions of the Fijians when the Wesleyan Church missionaries commenced their christianising work in the group in 1835 the Revs. W. Cross and D. Cargill being the first missionaries to preach the Gospel to this savage and cannibal people. Since that date the noble work of evangelisation has been carried out with vigour and success by the Wesleyan and Roman Catholic Churches. Rapine and plunder, savagery and cannibalism, and all the immorality of heathen life have disappeared before the civilising agency of British government and modern Christianity: consequently we find the Fijians of to-day a useful and law-abiding people, living, moreover, in the full enjoyment of their ancient rights and usages, and participating, also, in all the privileges granted to British subjects throughout the Empire.

With pioneering settlement the work of survey and exploration went hand in hand. For the preliminary part of this important undertaking we are mainly indebted to the accomplished officers of the British Navy and that of the United States of America, who conducted the marine survey of this coral-bound archipelago. It was not, however, till after the group was annexed to the British Crown in 1874 that the actual land survey of the islands was undertaken and carried out in detail. The preliminary part of this work was commenced by a small detachment of the Royal Engineers, under the direction of Col. Pratt. Shortly afterwards that officer and most of his assistants were withdrawn from the colony, and the work of the survey was taken up by a staff of government surveyors, including myself, and one or two of the Royal

Engineers who elected to remain behind. The earlier labours of these officers were chiefly directed to the coast survey and exploration of the island colony, undertaken mainly for the purpose of assisting the Royal Commission appointed to investigate the European land claims. This was followed up by the permanent cadastral survey, which included all claims to land allowed or confirmed by the Commission, the rivers and creeks, the mountains and other physical features. The whole work, based strictly upon the true meridian, which is undoubtedly the best method for Australasia, was carried out with a degree of accuracy and completeness that reflects the greatest credit upon the Survey Department of the colony, of which the Honourable John Berry is head.* This will readily be admitted by all who know the exceptionally difficult character of the country. Apart from the enervating influence of a tropical climate, the dense jungle, the intricate forest belts, the surface vegetation and the exceedingly rugged nature of the islands, combined to form impediments requiring great skill and physical strength to overcome. The daily task of climbing mountains, swimming rivers and channels, and wallowing in mud flats and among dense mangroves, must, sooner or later, produce a very marked effect even on the strongest constitutions.

Geographical Divisions.—The archipelago of Fiji comprises some 225 islands,† of which about 80 are inhabited, while several are mere barren rocky pinnacles, shot up, as it were, from the floor of the ocean. The total land area of the group is probably about 7,451 square miles. Of this, Vitilevu occupies some 4,112 miles, Vanualevu about 2,432, Taviuni about 217, Kadavu 131, and the residue is distributed among the other smaller islands of the archipelago. The area of Kadavu was very carefully determined by myself, and I contributed a paper on the physiography of the island to the *Scottish Geographical Magazine.*‡

For easy and ready reference, the colony may be geographically divided into four groups. These comprise the Eastern Division, known to modern geographers and to the natives as Lau, and including the Windward and Ono clusters; the

* The Departmental Staff is now reduced to two officers.

† "Macuata," by J. P. Thomson, F.R.S.G.S., Proc. & Trans. of the Queensland Branch of the Royal Geographical Society of Australasia, Vol. I, p. 27.

‡ "The Island of Kadavu" (with a map), by J. P. Thomson, F.R.S.G.S., The Scottish Geographical Magazine, Vol. V., p. 638.

Southern Division, embracing Kadavu, Moala, Totoya, Matuku, and neighbouring islets; the Western Division, comprising Vitilevu, Ovalau, Gau, Wakaya, Nairai, Mokogai, the Yasawa cluster, and surrounding islets; and, lastly, the Northern Division, including Vanualevu, Taviuni, Rabi, Koro, Qamia, Cikobia, Yadua, and others of less importance. These partitions, which, besides coinciding with climatic zones of different peculiarities, are sufficiently marked in themselves to establish their claims to recognition as distinctly separate divisions, are partly based upon the bathymetrical data, as determined by the marine survey of the British Navy. In Kadavu Passage, between the Southern and Western groups, there exists an abyss of some 1,020 fathoms in depth; on the east of the Southern Division there is a dip of 1,200 fathoms; in Nanuku Passage, separating the Northern and Eastern sections, the soundings show a depth of 548 fathoms. In some parts of the group the bathymetrical lines are not so pronounced as those I have noted; in others soundings have not yet been taken. Still, the other existing geographical features are, in themselves, sufficient reasons for adhering to the natural divisions here indicated.

Commodore Wilkes, in his narrative of the United States Exploring Expedition, divides the group into seven districts*; while Rev. Thomas Williams counts eight divisions†; and the natives, when speaking of different parts of the archipelago, refer to five provinces, namely:—Vitilevu, Vanualevu, Upper Fiji, Lower Fiji, and Central Fiji. None of these divisions appear to me to quite correspond to geographical characteristics of the group; the parts are, moreover, too fragmentary. The Yasawa Group is simply a chain of islets scattered over the northerly extension of the Great Sea Reef that encroaches upon the shores of the Nadi District on the west coast of Vitilevu. The whole base of this extensive northerly tongue has been carefully plumbed by the sounding line, and nowhere does the depth of water much exceed 40 fathoms, while in some places it diminishes to about a fourth of that depth. And yet this group

* "Wilkes's Narrative of the U.S. Exploring Expedition," 1838-42; New York.

† "Fiji and the Fijians," by Thomas Williams, late missionary in Fiji; Edited by George Stringer Rowe; Second Edition, London, Alex. Heylen, 1860, p. 15.

is classified by the writers just mentioned as one of the divisions of the colony.

Northern Division.—The island of Vanualevu, the second largest of the group, occupies the greater portion of this division. From its most westerly point, called Naicobocobo, in longitude 178 deg. 28 min. east, it stretches north-eastwards for about 100 miles, and, crossing the 180th or anti-prime meridian, terminates in Cape Udu, in longitude 179 deg. 56 min. west. From Savusavu Bay to the northern coast it measures about 21 miles across, but as the island contracts considerably in some places and in others greatly expands, it is scarcely possible to form an adequate conception of its shape or extent from a written description. To the south of Cape Udu lies the entrance to Natewa Bay, or the "Dead Sea" as it is called by the natives, an enormous indentation of some 40 miles in length, and, on a small scale, somewhat resembling the Gulf of Carpentaria, Queensland. Near the middle of the island and on its southern aspect is situated Savusavu Bay, a broad haven, wherein are to be found water and capital anchorage for trading vessels of every description. This and the bays of Nadi and Sandalwood, to the westward, are the most useful indentations on the southern shores of the island, while on the north side, snug harbours are to be found along the whole coast line. In a large island such as Vanualevu one would naturally expect to find a variety of physical features, nor are we disappointed in this respect. Along the entire seaboard extends a coast range at some places rugged and precipitous, at others easily accessible. On the north coast the elevations are from 1,200 to 2,000 feet, the continuity of the range being broken in several parts by extensive fertile valleys, through which flow the waters of the Dreketi, Wailevu, Labasa, Dogatuki and other rivers and creeks that carry most of the rainfall of the interior to the sea, while, overlooking the southern shores of the island, huge pyramidal masses, towering high above the neighbouring country to altitudes of some 4,000 to 5,700 feet or more, terminate abruptly near the water's edge. The topographical features of the interior are mainly composed of rugged and steep lateral spurs of the main coast ranges, with numerous precipitous hills, intervening valleys, limited areas of slightly

undulating and moderately flat lands and patches of swampy country. Running water is everywhere abundant, and although free from loose stones and rocky boulders the island region is not by any means an easy one to traverse, whether by the professional surveyor or natural history collector. The physical features of the smaller islands of this Northern Division are, for the most part, similar to those just described, except that along the whole coast line of Taviuni no deep bays nor sheltered inlets indent the shores of the beautiful and fertile island. Separated from the south-eastern coast of Vanualevu, by Somosomo Strait, Taviuni extends about 25 miles longitudinally from north-east to south-west with a perimeter of some 60 miles. The island is almost entirely occupied by a high mountain range, extending along its whole length and culminating in lofty peaks over 4,000 feet above sea-level. On the crest of this range, near the middle of the island, a beautiful placid lake of fresh water spreads itself over a deep depression, which, probably, is all that now remains of an extinct crater of a bygone age, when the group shook and trembled with the violent convulsions of volcanic activity, that shattered the great Melanesian Plateau into insulated fragments. On the eastern side of the island the spurs and outliers of this range spread themselves out to the seashore, and present a strange contrast to the general appearance of the western coast, where extensive patches of flat and gently undulating lands are met with. The island of Koro, to the south, and that of Rabi, east of Vanualevu, are both rugged and mountainous; as in the case of Taviuni, the former possesses no sheltered inlets of any consequence in which vessels may ride in safety during stormy weather. The most northerly outpost of this division and, therefore of the whole group, is the remote island of Cikobia, situated some 26 miles due north of Cape Udu. It is of an elongated tongue-shaped form, extending eastwards and westwards. Owing to its exposed position and the absence of safe and sheltered havens, this island is rarely visited, except by small trading vessels that call for *Copra* and the beautifully-manufactured floor-mats for which the place is noted.

Eastern Division.—Of the numerous small isolated islands and clusters of islets, that lie in close propinquity to each other within this division. Vanuabalavu, Lakeba, Cicia, Mago, Nayau,

Tuvuca and Kabara merit priority of place; not that they are remarkable in size, for the largest is only some 24 square miles in extent, but because they are the largest of this section. Except the first, which is long and narrow, and is indented by several bays and inlets, these islands are nearly round, with elevations that culminate in their centres. The island of Mago is the property of some Europeans, who formerly utilised it for the cultivation of sugar-cane. The other islands of which we are writing, are occupied by the natives, who cultivate many varieties of food products, for which the rich soil is eminently adapted. Apart from the romantic aspect of the coral-girt gems that stud these eastern waters of the group, the early association of the Tongans with this division, upon the shores of which they first landed, will always render it especially interesting to students of ethnology.

Southern Division.—Within this division are some very prominent and remarkably interesting features. Of the five islands of which it is mainly composed, Kadavu is the most important Extending in a north-east and south-west direction the whole island is traversed by an irregular, rugged, and strangely distorted mountainous range, culminating in several high peaks of some 1,140 to 2,750 feet above the sea level, of which Washington, Challenger, Korolevu and Korotusara are the most noteworthy.*

These and others of somewhat less elevation throw off steep and broken ridges that, radiating in various directions from the central peaks, terminate abruptly on the adjacent shores of the island, where their bases plunge deep into the waters of the ocean. Although its length is only some 33 miles, and the greatest breadth about 7 miles, the total length of coast line of this island is very considerable, owing to its irregularity and the succession of deep bays and intricate inlets which run far into the land, and, in one or two places, almost cut the island in two. At Tavuki Isthmus, indeed, the continuity of the mountain range is broken, and the land is so low that canoes and boats are frequently dragged across from one side of the island to the other. Where so many bays and inlets exist it is

* "The Island of Kadavu," by J. P. Thomson, F.R.S.G.S., etc. The Scottish Geographical Magazine, Vol. V., page 641.

only natural to expect that many snug and sheltered anchorages will be found. Chief among these is the excellent harbour of Galoa, where, in the earlier days of British settlement on the shores of these islands, the American mail steamers were wont to cast anchor in the smooth and limpid waters of a sheltered bay. These days of pristine vigour, alas! have gone, and we sigh o'er the memories of the past.

Mount Washington, or Bukelevu as it is called by the natives, which occupies the south-west end of Kadavu, is the landfall of vessels entering the group from the south. It is a very prominent landmark, but, except in very clear weather, the summit of the mountain is usually enveloped in dense vapour. Close to the north end of Kadavu lies the island of Ono, within the great Astrolabe Reef. It is small and somewhat roundish, indented by two or three convenient bays, and occupied almost wholly by a cone of volcanic origin; on its shores are scattered a few native villages.

The eastern limit of this division is marked by the picturesque islands of Moala, Matuku, and Totoya, all of which are composed of high broken ridges from 1,184 to 1,535 feet above sea level. The former is an irregularly-shaped island, indented by sheltered bays, and the latter has the curved outline of a horseshoe, with the opening to the south: it is probably a raised atoll, with a lagoon in the centre.

Western Division.—The land area of this division is larger than that of any of the preceding, and, by reason of its social and political history, this part of the group is undoubtedly of exceptional interest and importance. Great Fiji, or Vitilevu, is a large island, measuring 93 statute miles across its greatest breadth, from east to west, and 68 from north to south. Among the numerous commodious bays on the coast, the magnificent and picturesque harbour of Suva is pre-eminent. Situated on the south coast, it is flanked on the west by densely-wooded hills, while at its head and on the eastern shores nestles the European capital of the group. Here Government House occupies a picturesque spot on a gently sloping knoll near the southern end of the town, and the private dwellings of the government officials and other inhabitants are scattered over the hill-sides commanding an unobstructed view of the harbour

and surrounding country, with its green and variegated mantle of rich, luxuriant vegetation. Along the beach are the business houses and main thoroughfare, where busy people, dressed in helmets and light shirts and trousers, hurry along both early and late; the whole aspect of the place bears the impress of prosperity.

The northern and part of the eastern coast of Vitilevu is traversed by a range of high hills. In some places the spurs of this range encroach upon the sea shore, but there are parts where the base of the hills is bordered by wide strips of flat fertile land. Owing to the physical configuration of the country there are no navigable watercourses by which the interior can be reached, the rainfall being carried off by numerous creeks. On the southern coast, however, the physical conditions are entirely different; here are to be found tracts of flat land, many thousands of acres in extent, spread out over the coastal districts, and extending far back to the high and rugged mountain regions. Here, too, are located the two largest rivers in Fiji, the Rewa and Sigatoka; the former disemboguing into Laucala Bay, some eight miles east of Suva,[*] traverses a beautiful and fertile basin of great extent and richness. Including tributary streams its navigable length is over 70 miles, and it drains an area of some 1,360 square miles, or about a third of the area of the island; its principal affluents are the Wainibuka, the Waidina and the Waimmala. The first drains the western and southern watershed of the northern and eastern coast range, and the latter receives the waters of a high range that traverses the middle of the island from north to south, culminating in Muanivatu, about 4,000 feet above sea level.

It is in the western face of this range that the source of the Sigatoka River is located, separated from the head-waters of the Waimmala by the high and narrow crest of the mountain; the distance across the mountain between the head waters of the rivers is very short indeed. In point of magnitude the Sigatoka is scarcely inferior to the Rewa. From its headwaters, in the remote interior of the island, it drains the districts of Navosa, Nadroga, and Serua, and, meandering through wild broken

[*] "The Rewa River, Fiji," by J. P. Thomson, F.R.S.G.S., Proc. and Trans. of the Royal Geographical Society of Australasia, Queensland Branch, Vol. II, p. 32.

country of exceptional loveliness, foaming and tossing through deep narrow gorges, over and around huge boulders, reaches the sea at the south-west corner of the island.

On the north-west coast lies the Ba River, a large and important stream, with two principal affluents, that originate in the high and rugged mountain ranges of the interior. The lower basin of this river is composed of rich alluvial flats of considerable extent, mostly owned and cultivated by Europeans.

Concerning the physical features of the numerous small islands forming the remainder of this division, little need be said. Except in extent, they very closely resemble those of which a description has been given. Bau, the seat of the late King Cakobau, and the native capital of the group, is a small and insignificant island, connected with the east coast of Vitilevu by a long coral reef a few miles north of the mouth of the Rewa River. The early associations of this historical capital are full of wanton cruelty, savagery, and cannibalism, to which the rising generation is happily strange. Some distance north of Bau lies the island of Ovalau, upon the eastern side of which is situated Levuka, formerly the European capital, amid verdant hills and precipitous rocky cliffs. It is truly a charming spot of unsurpassed beauty, and, as it welcomes the morning sun, the hues and tints spread over the luxuriantly mantled hills and valleys present a picture of inimitable loveliness, nor can we deny this meed of praise to many other parts of this gem-like isle. It was on the shores of Levuka Harbour that I first touched Fijian soil, and it was at Nasova, the charming seat of Government, at the south end of the town, where my professional duties in the colony commenced. Enough! Upon sweet memories of the past no longer dwell.

Reefs.—In order to avoid repetition and to economise space, I shall deal with the reefs of the whole group together, instead of describing the coral areas of each division separately. The islands of Fiji are either wholly surrounded, or partially fringed, by coral reefs of three classes, usually distinguished as atolls, barrier reefs and fringing reefs. Of these we find a barrier reef, practically the only one of its kind in the whole group, extending north-easterly from the south-west corner of Vitilevu to Cape Udu, the Land's End of Vanualevu. Along the entire length

of this enormous barrier are numerous associated lateral fringing reefs, that skirt the shores of the small and moderately large islands scattered over the whole western side of the archipelago. At several places the Barrier Reef is cleft by roomy or narrow passages, and the numerous openings in the shore, or fringing reefs, afford a safe approach to the land. In the southern and eastern part of the colony the coral areas appear in the form of atolls with the usual enclosed lagoons. The form and character of these reefs are exceedingly interesting and their general aspect exquisitely beautiful. In coral-bound seas nothing can surpass the beauties of a submarine landscape with its exhaustless varieties of shapes and colours.

The origin, character, and permanency of the coral reefs of the great Pacific Ocean are subjects upon which many diverse opinions have been expressed. Recent investigations impugn the accuracy of the data upon which some of the earliest conclusions were established, and it is now certain that many of the premises upon which Professor Darwin based his theory of subsidence are not supported by fact. In a very able and exhaustive paper contributed to the *Scottish Geographical Magazine*, Dr. Guppy points out that in placing the Fiji Archipelago in an area of subsidence, Darwin was guided by defective and even erroneous evidence; that, as a matter of fact, the Lau Group "possesses elevated reefs sometimes removed 600 feet above the sea," and that the character of the *foraminifera* of the soapstone deposit at Suva, recently investigated by Mr. H. M. Brady, affords evidence of an upheaval in Post Tertiary times of from 1,000 to 1,200 feet.* This view of the question is entirely borne out by the writer's own observations in many parts of the group, and nowhere is the evidence stronger than in the interior of some of the larger islands, where the old coral beds occur in the mountainous districts. There can be no doubt, however, that the defective points in Darwin's conclusions are to be attributed entirely to the scanty and imperfect data with which he had to deal, and not to faulty judgment on the part of that eminent authority himself.

It is mainly to the investigations of Wichmann and Meinicke that we are indebted for our knowledge of the geology of the

* "A Criticism of the Theory of Subsidence as Affecting Coral Reefs," by H. B. Guppy, M.B., the Scottish Geographical Magazine, 1888, p. 121.

Fiji Islands, although others have contributed much useful information upon this interesting subject. From the information these authorities supply, which there is no reason to distrust, the geological character of the group is chiefly marked by the presence of plutonic rocks, with which are associated crystalline schists and over these lie accumulations of organic and volcanic deposits. While this general description holds good for most parts of the colony, there are several places in the larger islands where sedimentary rocks occur, and these have yielded fossiliferous deposits of Tertiary age. It must, however, be understood that within the limited scope of this paper little more than a general sketch of the geological features can be given.

The Soils of Fiji are rich and various: river valleys and flat lands are covered with a deep alluvial soil of wonderful fertility, and deltaic areas are composed of highly fertile alluvial and diluvial deposits that are being constantly added to. On hilly country, and low undulating areas, the surface soil is a free and stiff loam, rich in humus. Extensive areas of rich *debris*, highly charged with phosphates fringe the bases of mountainous country; while the mountain slopes are covered with fertile soils, mainly composed of organic matter. The highly productive qualities of all of these are everywhere apparent in the density and luxuriance of the forest vegetation.

A word may be said on the *Scenery of Fiji*. To state that the scenic beauties of the archipelago are charming, conveys no adequate conception to the mind. To enable us to picture and to realize beauty we require to see—to appeal to the senses: it is therefore obvious that an attempt to portray the natural loveliness of this island colony by a word picture must inevitably result in failure. Beauty of the most sublime grandeur is here to be seen—on the hills and mountain faces; in the narrow glens and gorges; along the windings of the rivers; in the rapid foaming streams; by the silent lakes and marshes; and on the widespread plains and valleys;—there the eager eye beholds the magnificence of nature, in the tints and shades of verdure and the richly-coloured foliage of the giants of the forest and the creeping vines and leaves; while the ocean, with its beauties, mid the submarine structures and mighty foaming billows, as they crash against the faces of the ponderous Barrier

Reef, impresses the spectator, as amazingly he gazes on the surface of the water o'er a scene of majestic beauty, wild and terrible at times. In the different countries through which I have wandered I have seen nothing to surpass the natural loveliness of the coral-girt isles of Viti. There is something that seems to bind one to the place—a kind of preternatural power that possesses one, an enthralling influence of clime, place and people, that overpowers and takes complete possession of those who live any length of time in the colony. The feeling is an agreeable one and the influence slow and imperceptible.

Products.—The natural products of this flourishing young colony are very considerable. From *bêche-de-mer* alone a sum of over £4,812 was derived in the year 1887;* and this sea-slug is scattered over the surface of the coral-reefs of the archipelago. There are several varieties of wild fruit, including oranges, mangoes, shaddocks and guavas. There are also wild bread-fruit, yams, and other edible tubers. In the forests are gums and several varieties of very valuable timbers, including sandalwood. At one time there was a very considerable and remunerative trade done in the latter, but now it is scarce, and for several years has not been exported from the colony. To gums very little attention has been given, the energy of the colonists being directed to enterprises of greater magnitude; it is, in consequence, an industry awaiting development at the hands of some enterprising trader who may here find the means of profitable employment. Of pearlshell and tortoiseshell the export is at present small, but there is probably room for developing this very profitable industry. At the present time sugar, *copra*, and green fruit constitute the staple products of Fiji; the cultivation of the former has for many years been restricted to the earlier settled districts of the Rewa, Ba, Mago, Navua and Serua; now the Colonial Sugar Refining Company has extended its ramifications to the Labasa and Wailevu, on the north-west coast of Vanualevu, and, in other suitable parts of the group, the cultivation of the sugar-cane is receiving attention. Exclusive of local consumption, the total value of the sugar exported from the colony in the year 1891 was £327,526.*

*Statement of the Trade and Navigation of the Colony of Fiji: Legislative Council Paper No. 12, April, 1893.

Copra comes next in importance, and although the market for this article is at present low, the cultivation of the coconut industry is developing rapidly. After the palms are planted they require little care or attention, and at from five to seven years of age they bear fruit, and continue to do so during man's allotted span of life. For the year 1892 the value of *copra* and desiccated coconuts, exported from Fiji, was over £65,300. Notwithstanding competition the value of the green fruit exported has increased from £22,623 in 1886 to £61,501 in 1891. Nearly the whole of this amount represents the value of bananas shipped for Australian and New Zealand ports, chiefly to New South Wales, Victoria and Auckland. The intercolonial steamers carry some 40,000 bunches monthly to Sydney. For perfect development and richness of flavour the Fijian banana is pre-eminently superior to any other in the market. It requires no microscopic analysis to detect the delicious qualities of this luscious fruit; the marked contrast between it and the insipid local varieties may be detected at a glance. The bananas grow and flourish in most parts of the colony of Fiji, the soil and climate being eminently suited for the development of this most valuable and remunerative industry. There are, besides, abundance of pines of several varieties; these, too, are exported in considerable quantities; they grow to perfection, are deliciously flavoured, and consequently fetch a high price in the Australian market. Formerly the cotton industry of Fiji was a very flourishing one: in recent years it has received but little attention, owing to the low prices prevailing. Experience has, however, abundantly shown that the group can produce cotton of a quality better than can be obtained in any other country. On the black loamy soils of the elevated slopes, and in the rich sandy flats, the sea island variety grows to perfection. That a valuable and highly remunerative industry in the cultivation of tobacco could be established in the colony there is no doubt whatever in my own mind. Cultivated almost exclusively by the natives, the plant flourishes luxuriantly in all parts of the group. For some unaccountable reason, most probably owing to inexperience in curing the leaf, this has, until quite recently, been almost entirely neglected in Fiji. In a colony where there is a large consumption of tobacco by both Europeans and natives, it is astonishing that

such a paying enterprise should yet await development. At one time coffee growing promised to take a prominent place among the highly remunerative industries of the colony. A large area of land at Bua, on the Island of Vanualevu, was cultivated and planted with coffee, and the prospects of success were most encouraging, when, in an evil hour the plants were smitten with a disease well known in Ceylon—*Hemileia Vastatrix*, and thus a prospective source of wealth was destroyed. Owing to the introduction of coolies for plantation work, the amount of rice consumed locally is over 1000 tons annually. This at first was imported, but now, its successful cultivation within the group will supply the demand. Experience has amply demonstrated the suitableness of the Fijian soil and climate for the profitable cultivation of this esculent grain, and the necessary machinery for hulling and polishing has been imported by the Government. Cinchona cultivation is, as yet, very much neglected in Fiji. It is much to be regretted that the necessary capital is not available for the cultivation of this tree, which, in Fiji, flourishes more vigorously than in any of the Asiatic regions. Fifty bushels to the acre is the average yield of maize, and in many localities the rich alluvial soils yield as much as 80 or 100 bushels—two, and sometimes three, crops being harvested annually. To tea-drinkers it will no doubt be interesting to know that in Fiji the average yield of this herb is about 600 lbs. per acre. The industry is yet in its infancy, and consequently there is more consumed locally than the planters can supply; it meets with a ready market at from 1/9 a pound, and its delicious quality and flavour are much appreciated. Vanilla and ginger are also produced in the colony: the quality of the former is pronounced by experts equal to that grown in Mauritius, and it is believed that in Fiji the yield will be a very large one. A comparative analysis of samples of ginger from Cochin China, Africa, Jamaica, and Fiji conclusively shows that the Fiji article is much richer in active constituents than the others. Peanuts also flourish in Fiji; they are gathered by the natives, and contribute from £4,000 to £5,000 annually to the revenue of the colony. In addition to what may be termed the main products of Fiji there are many others imperfectly developed, which could be rendered more profitable by cultivation, or only need enterprise and capital

to render them remunerative. There is abundance of arrowroot; an excellent opening for the cultivation of sisal hemp, for which there is plenty of suitable land; and a highly remunerative industry in castor, and other varieties of oil-producing seeds and nuts, that grow wild and luxuriantly in almost every part of the group, might be established. To these may be added the West African Kola Nut (*Kola acuminata*), the Peruvian Coca (*Erythroxylon coca*), and Cinnamon, which have been recently introduced to the colony by His Excellency the Governor, Sir J. B. Thurston, who, in his interesting inaugural address to the Agricultural and Industrial Association of Fiji, earnestly invited attention to the commercial value of these plants and their profitable cultivation elsewhere.* Oranges, and occasionally limes, grow wild in the virgin soils of the colony, the surface of the ground in many places being covered with a layer of the decayed fruit that annually falls off the trees. A few oranges are used by the natives as a substitute for soap, but, otherwise, there is no effort to utilise them, nor to cultivate them systematically, although the Chief Justice of Fiji, Hon. A. S. Berkley, pointed out the advantage of their cultivation, drawing attention to the profits derived from the lime and orange industry in the West India Islands, where the concentrated lime juice and essential oil of limes are extracted, and a brisk trade has long been carried on in oranges.

Besides the products cultivated by Europeans, it must not be forgotten that a considerable revenue is annually derived from exclusively native produce. The Fijians are an agricultural race, and, in addition to large quantities of food for their own consumption, plant cotton, sugar-cane, tobacco, bananas and maize, as well as other profitable articles of commerce, which are sold on the spot to European traders or taken to the most convenient market. It is usually from the surplus produce that their annual tax is paid to the Government. The commercial prosperity of Fiji mainly depends upon the successful development of the extensive agricultural resources of the colony, viewed from a broad and comprehensive standpoint. In the sugar industry a large amount of European capital is invested and employment found for a great number of people. Formerly, Polynesian

* Hand Book to Fiji, 1892 (by authority), p. 50.

labourers and Fijians were more generally employed to work the sugar plantations and in other industrial pursuits, but it was soon found that competition in the recruiting field from neighbouring colonies interfered with the island labour traffic to such an extent that it became impossible to meet the demands of the local labour market, and consequently arrangements were made in 1879 for the introduction of Indian immigrants. Of these there was in the year 1892 a population of some 10,000 souls in the colony. They are recruited in India and brought to Fiji on the requisition of employers, at an average cost of from £16 15s. to £23 6s. for each adult. When on time-work men are paid a daily wage of 1s. and women receive 9d. per day. They provide their own food, but the employer finds them quarters and medical attendance. These coolies are brought to the colony for ten years; five of these they pass in the employ of the original requisitioner; during the remainder they work as free men, and at the end of that term are carried back to India at the expense of the State. The number of Polynesians at present in Fiji is about 2,400, obtained chiefly from the Solomon and New Hebrides archipelagoes—the initial cost of introduction amounting to £16 per head, besides £5 to £7 a head for the return passage paid by the employer. Unlike the former class of labourers the Polynesian is indentured for a period of only three years; during this time his wages are from £3 to £6 per annum in addition to food, clothes, house accommodation and medical attendance. At the expiration of his term of service he is free to return to his home or to re-engage by the year at a wage of from £10 to £12 per annum. Besides these, there is a large complement of Line Islanders (Gilbert Islands), known in Fiji as *Tokelaus*, employed at one of the copra and fibre-manufacturing stations at Cape Udu; these are imported by the station owners-themselves. Fijians may be employed within prescribed districts, under certain regulations enacted by the Legislature, at a wage of about 8d. per day and rations.

Of the different classes of labourers the Polynesians are generally preferred. When properly treated they are kind, affectionate and willing, and are excellent and intelligent workers —upon this point the writer can speak from experience. For

general plantation work, where the clearing of scrubs and felling of timber are required, Fijians are very capable workers; they are good in performing allotted tasks and for river traffic service, but, to give satisfaction, they require to be away from the immediate influence of their own people.

Fauna.—Fiji is perhaps not remarkably rich in reptiles and other forms of animal life; its avifauna is limited to several varieties of wild duck, parrots, pigeons and hawks; to snipe, sandpipers, the golden dove and swamp hen; to the white and grey cranes, the cat bird and other minute forms of the feathered family that dwell in forest solitudes. Lizards are numerous. Land and water snakes are luckily few in number and variety; the former lurk among the lower branches of trees, while the latter are sometimes found along the sea-shore—both kinds are apparently innocuous. Beetles, butterflies, and moths are plentifully represented in all parts of the group, and so are numerous other forms of insect life, from the tiny sand-fly to the venomous scorpion and stinging wasps. Worms there are, too, and ants of various kinds, nor must the scintillating little fireflies, the mosquitoes and the common house-flies be forgotten. The latter are somewhat troublesome but they do a great deal of good as scavengers. To the entomologist Fiji offers many attractions that are by no means common. The marine fauna is extensive in variety and unsurpassed in beauty. A marvellous number of fish of all shapes, sizes, and colours haunt the intricacies of the coral areas of the group. In preserving these fishes some difficulty was formally experienced in retaining their colours, and it was not until someone succeeded in preparing a mixture of glycerine and some other chemical substance that this obstacle was overcome. Sharks are numerous but alligators are not present in the rivers and creeks. The molluscan fauna is amazingly rich in beautiful types; they range in size from the large clam shells down to the minutest forms. Land and fresh-water shells are also fairly numerous; the former are often found in the hilly ranges of the islands, and the latter abound in the rivers and creeks. There are a few oyster beds in some parts of the group, but these bivalves are very large here and the quality inferior to the Australian cultivated oysters. Crabs

and fresh water prawns are plentiful: they are captured and eaten by the natives. There are turtles in abundance, and lobsters also exist, though they are the least common kind of shell-fish. The tree-climbing crab is also to be found in the northern part of Fiji. Cattle, pigs, and poultry thrive well in the colony; of the latter a very great number are owned by the natives, and are to them a source of wealth. A small rat and a flying fox are generally supposed to be the only mammals really indigenous to the group.

Flora.—Within the narrow limits of a paper it is scarcely possible to do more than briefly summarise the leading features of the flora of a tropical region so densely clothed with a mantle of various forms of vegetation as Fiji. Generally speaking the south-eastern side of the islands is covered with forest; on the opposite side forested areas occur in patches only, where the vegetation is more diversified and less vigorous. There is really no satisfactory reason why this should be so, considering the comparatively narrow areas of some of the islands. Very probably the vegetation of this group, as with that of other parts of the world, is largely influenced by the conditions of soil, and, possibly, the prevailing south-east winds contribute to its luxuriant growth. It is popularly believed that the air of the windward side of the land of Viti is more highly charged with moisture than that of the opposite side, but in this opinion I have always refused to concur, especially as there are really no lofty mountain ranges to interfere with an equal distribution of humidity. To the surveyor and the explorer the scrubs and other forms of vegetation are most exasperatingly dense. I was told when I went to Fiji that in some places the scrub was so thick that a party of seven or eight men could only cut a track of seven or eight chains long in a day, and subsequent experience amply confirmed this statement. Dense and extensive areas of mangroves are usually associated with the salt-water swamps and mud flats along the seashore. The wood of this tree is very flexible and tough; the natives use it, with other sorts, for house-building and fencing purposes. In the forests are many kinds of really excellent and valuable timber trees; of these the vesi (*Afzelia bijuga*) and dilo (*Calophyllum inophyllum*) are especially well adapted for cabinet work,

their grain being very beautiful and taking a fine polish. For durableness the former is little inferior to English oak. For building boats and other larger vessels the local shipwrights use the dakua (*Dammara vitiensis*), vivi (*Serianthes myriandenia*), and damanu (*Calophyllum Burmanni*). The buabua, or Fijian boxwood, is probably the most durable wood to be found in the group; it is used for a variety of useful purposes. There is a timber light as cork, known to the natives as the rara, and the viriviri is but little heavier. There are also the excellent timber tree, dakua salusalu (*Podocarpis vitiensis*), and other noted highland dwellers. The weird-sounding Nokonoko ironwood (*Casuarina*) also flourishes, the economic ivi tree, or Polynesian chestnut (*Inocarpus edulis*), and the lowland-loving pandanus palms. On the authority of Mr. John Horne, Director of the Mauritius Botanic Gardens, who spent a year in the colony,* the indigenous flora of Fiji numbers some 1,086 species of flowering plants and 245 species of ferns and allied plants; of these 635 species have been met with in Fiji only. The most numerous orders are *Leguminosæ*, represented by thirty-six genera and sixty-two species; *Rubiaceæ*, by twenty-three genera and 122 species; *Orchids*, by twenty-five genera and forty-nine species; *Euphorbiaceæ* and *Urticaceæ*, each with twenty genera and 131 species. In addition to these there are doubtless new forms that await discovery. Of economic plants Fiji possesses many representative forms, to some of which reference has already been made. The Yaqona plant (*Piper methysticum*) grows luxuriantly, and combines the qualities of utility and ornament. I cannot agree with the Rev. Thomas Williams and others who speak of the "narcotic" qualities of the beverage manufactured from it. The candle nut tree (*Aleurites triloba*), or lauci, as it is called by the natives, grows in abundance in most of the islands of the group. There is also a plentiful supply of delicious fruits, of which are the wi (*Spondias dulcis*) and kavika (*Eugenia Malaccensis*). Flowering plants are numerous and, with variegated shrubs, lend beauty and brightness to the landscape. Of these the hibiscus is most conspicuous. Nowhere else do I remember having seen such a copious variety of these remarkably developed flowers.

* A Year in Fiji, by John Horne, F.L.S., &c., p. 58.

Natives.—To do justice to this subject would require the scope of a book. It is, however, always interesting to refer even briefly to the social condition of a people who live in remote and isolated parts, and especially to the ways of those who have been rescued from the debasing influences of savagery and cannibalism by the pioneering enterprise of Christianity and commerce. To the ethnologist the origin of the Fijians and other neighbouring peoples who occupy the widely scattered Pacific Islands, is a subject pregnant with interest and one upon which there is, no doubt, room for diversity of opinion. Philological data led to the belief that at some remote period the peoples of Polynesia were more closely associated than their present position would seem to indicate, and it is upon this aspect of the subject that I will now say a few words. How were the islands of Fiji and other parts of Polynesia peopled? Whence did their inhabitants derive their origin? If we were able to supply a satisfactory answer to these questions nothing further would be required. But in the absence of some historical record we can do nothing but speculate. However, in the case of Fijians I am disposed to support the opinion of the Rev. Thomas Williams * and other contemporaries who believe in the Asiatic origin of these island dwellers. In his excellent paper, contributed to the Geographical Society of California, Mr. Crawford Johnston furnishes what appears to me abundant evidence of the early connection of the Phœnicians with America, that, in fine, "the Aztec was the product of Phœnician adventure and civilisation." † It was the preternaturally adventurous spirit of these people that impelled them to undertake long voyages from the shores of Asia to the west coast of South America, and Mr. Johnston points out that their track, across the South Pacific, lay through Torres Straits eastwards, and, after skirting the shores of the islands of Fiji, Tonga, Samoa, and other eastern groups, terminated on the American coast, at Mexico and Peru. Along this great ocean highway Asiatic commercial enterprise and civilisation ran hand-in-hand, for how long none can tell. But we are justified in inconjecturing that it was along this highway that the scattered groups of Polynesia were peopled.

* "Fiji and the Fijians," p. 18.

† "Did the Phœnicians discover America?" by Crawford Johnston, Geographical Society of California: Special Bulletin, 1892.

In colour and physique the Fijians, Samoans, Tongans and Maories are much alike, while between them and the natives of British New Guinea many dialectic affinities and similarities are known to exist. Attention has recently been invited to these by Mr. S. W. Brooks, in an interesting paper contributed to the Queensland Branch of the Royal Geographical Society of Australasia, in which the author points to the remarkable similarity between the causative prefix "Vaka" of the Fijian language and the Hiphil and Hophal conjugations of the Hebrew verb.‡ Taking these philological fragments in conjunction with the evidence adduced in support of our theory of the great "Melanesian Plateau," to which attention was drawn in an earlier part of this paper, we may conclude (1st) that the peoples of New Guinea, New Zealand, and Polynesia are sprung from Asiatic stock; (2nd) that their physical and dialectic dissimilarities are due to tribal distinctions and not to racial differences; and (3rd) that these regions were peopled contemporaneously with the continent of America.

Class distinctions are generally recognised by the Fijians, and by no other race of people are they more rigidly respected. There are kings and queens, provincial chiefs, chiefs of villages, the low-born who have gained distinction on the field of battle; the masses and the slaves. The king is designated *Tui*; *Roko* is the official title of a provincial chief, and a village chief is called *Turaga ni Koro*. The king is the head of the native state, and the provincial chiefs are his ministers. The native Parliament is held annually in each province in succession, and is usually opened by Her Majesty's representative. The session is short, and it is customary for the European Secretary of Native Affairs to be present during the sitting. The programme is arranged beforehand, and the occasion is one of unusual activity and feasting. New houses are built to accommodate visitors from neighbouring provinces; turtles are brought from all parts of the group; pigs are slaughtered wholesale; tons of vegetable food are consumed *ad nauseam*, and European delicacies find a place at the festive board. There is no lack of food while the session lasts, but extravagance is too often followed by dearth, and it

‡ "Grammarial and Glossarial Similarities of the Languages of New Guinea and Fiji," by S. W. Brooks. Proc. and Trans. of the Queensland Branch of the Royal Geographical Society of Australasia, Vol. VIII.

not infrequently happens that for several months the majority of the people live upon wild vegetable food. Formerly the Fijians were divided into numerous septs, and these were constantly involved in warfare. There were the Kai Colos, who lived in the mountain regions of the interior, and the Kai Wais, dwellers on the sea-shore; the former wild and incorrigible, the latter cunning and voluble. Since the establishment of civil government and the development of missionary work, tribal distinctions in many districts have been almost altogether effaced, while in remote places the old order is greatly modified. The process of transition, in some cases, has, no doubt, been slow and gradual, but the fact remains that the entire native population of Fiji now acknowledge Christianity and the authority of the British government, and appreciate the beneficial influences of these powerful civilising agents.

Throughout the group the Fijians live in coastal towns, in villages located along the rivers, and in the remote district of the interior. Some of these centres are large, clean, and healty, and decidedly attractive. The larger towns are usually built round roomy squares, and it is within this public space that the usual village amusements take place, when it is not being used for more important public purposes. Unlike the native houses of New Guinea, the Fijian dwellings are not raised on piles, but usually on foundations, often several feet in height, composed of coral and gravel. The houses are substantially built of hard and durable timber; the ground plan is usually rectangular, and the ridge-pole rests on long end and intermediate posts; the sides are supported by upright studs, that, like the posts, are sunk in the ground, and between these are reeds, fastened by strong cords of fibre sinnet and wild vines. The roof is thatched sometimes with the leaf of the sugar-cane but more frequently with grass and the leaves of wild plants. In most cases the sides are also thatched. The interior of chiefs' houses and of those belonging to the better classes is beautifully ornamented with plaited cords of dyed cocoanut fibre, called *Magimagi*. The outer ends of the ridge-poles are usually ornamented with white cowrie shells, or with some other distinctive object, and the doorways are often elaborately finished off with coloured sinnet. In the chief provincial towns there are churches, school-houses, native

court-houses, and jails. There are large club-houses, where the men meet to discuss social subjects and the affairs of the State. A house is provided for each family and the girls sleep in separate quarters. Formerly many of the towns were fortified by deep ditches and palisades; in many places traces of these are still to be found, notably in the interior of Vitilevu, where a typical example of a Fijian stronghold exists in "Fort Carnarvon." At this post an European officer has been stationed for years, but the Fijian style of the fort is preserved. In their days of heathenism, polygamy was a recognised institution among the natives of Fiji. As a rule the custom was restricted almost exclusively to the chiefs, the common people being usually unable to keep more than one wife. To the number of wives belonging to a chief there was practically no limit, and the lot of these poor creatures, the favourites excepted, was not always enviable. Happily the old order of things has now completely passed away, and the full privileges of English marriage law are enjoyed throughout the group. These seem to commend themselves to all, and the divorce court is rarely resorted to. As a rule the Fijians have very small families, usually not more that two or three children each; there are strong reasons for believing that in most cases the number of children is regulated by the mother, but the domestic habits are not favourable to a rapid increase of population. The children are well nourished and cared for; they have adundance of out-door exercise; they are trained in sports, in industrial pursuits, and receive religious and secular instruction. The village schools are conducted by native teachers attached to the Wesleyan and Roman Catholic bodies. Besides these, there are native State schools and the Wesleyan Training Colleges, where the native teachers are prepared. The whole educational organisation is very complete and reflects great credit upon the promoters. The children are bright and intelligent; they learn to read well and to write well; they are fairly good at figures, and they sing agreeably. In the Roman Catholic schools they read music and their songs are accompanied by the organ. Their religious instruction is carefully attended to, and, in most villages, morning and evening prayers are conducted, preceded by a hymn, in which old and young join. The Sabbath is a day of rest, and all take part in

devotional exercise. Outwardly these people are Christians, but that they are so at heart I cannot affirm after my long experience in their midst. Their domestic relations are, in many respects, most admirable, and not unworthy of emulation by a much higher order of civilisation. The cares and worry of life are matters of little consequence to them; they are happy and contented, and take little thought for the morrow. They are affectionate and hospitable to a fault; giving strangers a cordial welcome and supplying the hungry with abundance of food. As in times of old, the women still occupy an inferior position and do a large share of household and out-door work. But they do so without complaining, even when their lords and masters are enjoying ease and comfort. The domestic implements of this people are few and simple; the ground is dug with long-pointed digging sticks, and broken up and weeded by hand. Before American axes and other steel tools were introduced the natives used stone axes; for knives they used shells and split bamboos; plaited cords of fibre and wild vines were substitutes for nails, and, even now, these home-made articles have not been entirely superseded. The cooking utensils consist of earthenware pots, with occasionally vessels of European manufacture, but the earth and stone oven is used when much cooking has to be done. Wooden troughs and baskets lined with banana and bread-fruit leaves are used for serving up food, and fingers take the place of forks. Their weapons consisted of the spear, the club, the battle-axe, the bow, a large sling, and the European musket. Of clubs a great variety was formerly used by the Fijians, and with these effective weapons the condemned were usually despatched. The canoes are sharp at both ends and have out-riggers. Some large war and trading canoes are built double, with long raking masts and mat sails; they are steered by an oar, and can lie very close to the wind. The smaller reef and river canoes are single, hollowed-out logs of wood, but the larger kind are built of several dug-out pieces. They are very strongly and skilfully made, and they sail very fast, but I never felt comfortable and easy in mind when travelling by them, although they often accomplish long sea journeys. Although naturally lovers of ease, the Fijians are often occupied in useful industrial pursuits; the women are expert mat-makers, and they manufacture a very fine native cloth

called *masi*, from the bark of the *malo* tree, while pottery is also turned out by their skilful hands. The men build houses, fashion canoes and weapons, manufacture sinnet, and cultivate the ground. They are all expert swimmers, and instances are numerous of shipwrecked crews having reached land after spending over a day and a night in the water without support. To Europeans this may seem an extraordinary feat, but the Fijians make no boast of it. It has always been a matter of surprise to me how insensible these people apparently are to physical pain. They cut and bruise themselves, and they burn themselves with faggots of wood, but the pain is borne in silence.

The Fijians, certainly, have many excellent and noble traits of character, and it is unjust to call them a weak and cowardly race of people. They were undoubtedly anthropophagi, and many horrible and revolting cruelties stigmatise their early history, but now they are civilised and useful British subjects, living in peace and enjoying prosperity. Generally speaking they are strong and healthy; sufferers from ringworm and ophthalmia are sometimes met with, but phthisis is not a common disease; it is, indeed, from elephantiasis they suffer most, and this disfiguring and insidious affection constantly presents itself in every part of the group—the legs, feet, hands, arms and scrotum being the parts generally affected. The peculiar initiation ceremony of the Australian blacks and of other coloured races was formerly practised by the Fijians, especially by the tribal communities of Vitilevu, where certain districts were dedicated to the rite. In Fiji it is called the *Naga*. The veterans are very reticent upon this subject, and only those intimately acquainted with native life and character can obtain particulars of this interesting ceremony, which is now a thing of the past and rapidly sinking into oblivion.

There are several dialects spoken, but they differ so slightly that people of one province have no difficulty in communicating with their neighbours of another district, especially since the adoption of the Bau tongue as the written language of the country. Of this there is a grammar and a dictionary, the product of missionary labour. The English alphabet is used with the omission of the letters H, X, and Z.

Population.—In the beginning of April 1891, the native population of the group numbered 105,800, made up of 56,445 males and 49,355 females.* It is, however, believed that there are about 3,700 more than the number actually recorded.

Climate.—Although lying within the tropics, the Fiji Islands are exceptionally healthy. During about eight months of the year the tropical heat is greatly modified by the south-east trade winds, when the temperature is agreeably warm without being oppressive. At the approach of night these winds gradually die away and are superseded by the cool, refreshing land breeze; but, when the sun brightens the eastern sky, there is usually a calm of a few hours' duration till the trade winds set in about 10 o'clock. Generally speaking, these are the ruling climatic features from April till November, when dull, wet, and stormy weather prevails. There is generally some anxiety felt during this unsettled period, to which the name of "Hurricane Season" has not inappropriately been given. It is between December and the end of March that the devastating hurricanes, of which so much is heard, sometimes sweep across the Southern and Western Pacific with terrific force, uprooting trees, overthrowing houses, dashing vessels upon the coral-bound shores, and destroying the European and native crops. The minutest description can convey no adequate conception of these cyclonic disturbances that discharge their pent-up fury in torrents of rain and tempestuous blasts. But crops grow rapidly in the rich soils of Fiji, and after the lapse of a few weeks the face of the country again smiles with an abundant harvest, and people in their happiness forget the fury of elements amid increasing prosperity. European children thrive well in Fiji, and so do women who are thoroughly acclimatised; but I am constrained to concur with those who maintain that a tropical climate does not contribute to the general health of European females for prolonged periods. Indeed, to some female constitutions the enervating influences of a tropical climate is positively inimical. But, as already remarked, most of the European lady residents of Fiji enjoy good health, epidemics being very rare and malarial fevers unknown. It is during the wet season the greatest discomfort is felt, when the excessive humidity permeates everything and renders life oppressive.

* Twelfth Annual Report of the Vital Statistics of the Native Population, years 1890-1891.

Of the four divisions of the group, the southern is undoubtedly the coolest: the eastern is dry and cool; the north-west half of Vanualevu is dry and moderately cool, but, the mass of land being greater than in the preceding divisions, the rainfall is less regular and the climate less uniform. Over the western division a greater precipitation occurs, and the climatological conditions are, perhaps, more irregularly distributed than in other parts of the archipelago, where the land areas are smaller. The barometric pressure ranges from 29·90 to 30·10 inches. The maximum shade temperature averages 84 degrees, and the minimum 72 degrees Fahr. The highest reading, 92 degrees in the shade, was recorded on four days in April and in December 1891, and on the 16th September of the same year the lowest reading of the thermometer was 61 degrees.

Government.—A Governor and an Executive Council administer the affairs of the Crown Colony of Fiji: a Legislative Council is also constituted, consisting of the Governor, as President, the Chief Justice, and departmental heads with whom are associated an equal number of unofficial members nominated by the Governor and appointed by the Queen. The present Governor and Colonial Secretary is Sir J. B. Thurston, K.C.M.G., a warm supporter of science. For administrative purposes the group is partitioned into fifteen provinces, named as follows:—Rewa, Tailevu, Naitasiri, Namosi, Serua, Colo, Nadroga, Ba and Yasawa, Ra, Lomaiviti, Bua, Macuata, Cakaudrove, Lau, and Kadavu. At the head of each of these there is a native official paid by the State.

If an excuse be necessary for the rather inordinate length of this paper, it is hoped an adequate one will be found in the wide scope and vast importance of the subject. Nothing has been included which could have been omitted without impairing its value as a conscientious and trustworthy contribution on the broad geographical and physiographical aspects of the subject.

For valuable statistical information, my cordial thanks are due to the Honourable the Colonial Secretary, and to the Assistant Colonial Secretary, Mr. James Stewart, of Fiji.

The paper was illustrated by numerous lantern slides showing typical examples of people and scenery. The lantern was lent for the occasion by Dr. John Thomson, who kindly manipulated it. Dr. Thomson was accorded a very hearty vote of thanks for his valuable services.

SIXTH ORDINARY MEETING.

Ninth Session.

The sixth ordinary monthly meeting of the ninth session of the Royal Geographical Society of Australasia, Queensland Branch, was held in the rooms of the Society, old Education Office, William street, Brisbane, on the evening of Thursday, May 31, 1894. The President, J. N. Waugh, M.D., occupied the chair.

The Hon. Secretary stated that the Council had decided to recommend the appointment of an Hon. Librarian, to take charge of the library of the Society. He also gave notice of his intention to bring forward a motion at the annual general meeting of members to amend Clause 32 of the Rules and Constitution of the Society, conferring discretionary powers upon the Council to deal with members in arrears with their subscriptions.

The author read the following paper :—

A Remarkable Bottle-voyage.

By Major A. J. Boyd.

Through the courtesy of our indefatigable Hon. Secretary I have been placed in possession of a small but very interesting document which would undoubtedly have some valuable information to impart were it gifted with the power of speech. As it unfortunately cannot tell its own tale of its devious wanderings we must see what science can do to throw light upon the journey performed by this waif of the ocean. In December, 1890, Captain James Michael, of the L.M.S. "Harrier," enclosed this piece of paper in a bottle, noting on it the date and the latitude and longitude of the spot where it was committed to the mercies of the sea. A request was also appended that the finder would forward it to the Royal Geographical Society, Brisbane.

The bottle was thrown overboard on the 4th December, 1890, in latitude 11deg. 26min. South and longitude 147deg. 30min. East. It was recovered in October, 1892, in latitude 6deg. 10min. North and longitude 171deg. 40min. East, having thus travelled

17deg. 36min. in a northerly direction and 24deg. 10min. in an easterly. Had the bottle travelled in a direct line in a N.E. direction the distance to be covered would have been between 1,800 and 1,900 miles. But we have to take into consideration the direction and strength of currents, the direction and strength of the local winds, and the set of the tides. There is also the possibility of a neutral area resulting from a return current, such as we find in the Sargasso Sea, which occur both in the Atlantic and Pacific. In such a whirlpool the waif may have been delayed for a long period before it entered upon the edge of a current strong enough to carry it out of the neutral space and onward on its voyage.

We have now to consider by what agency our waif reached the Marshall Group, where it was discovered. As before stated, the winds, currents, and tides were either the propelling or retarding factors on the voyage. Here we meet with a difficulty at the outset, for very little is known about the local currents amongst the islands south and east of New Guinea. But the tides are better understood, although I am informed by Captain Pennefather, R.N., and by Captain T. M. Almond, Portmaster at Brisbane, that no dependence can be placed upon the tides. In Torres Straits the tides run at the rate of twelve miles an hour, making it impossible for a sailing vessel to stem them, and when the tide is running in a N.E. direction it is impossible for a sailing vessel to make a S.W. course. Even the steamers of E. & A. Co. can scarcely steam against it. In Albany Passage, with two anchors down, steamers have been compelled tokee p up a full head of steam to keep the anchors from dragging.

If our waif had been dropped overboard off the Gulf of Guinea, on the West African coast, we could unerringly have traced its course to Cape St. Roque, in Brazil, and thence either in a northerly direction to Newfoundland, the British Isles, and the Arctic Ocean, possibly as far as Spitzbergen; or if it took the southern branch of the Equatorial current, then we should trace it through the Brazil current to the mouth of the La Plata, and then once again across the Atlantic to the Cape of Good Hope, where it would turn northward to repeat the endless journey. Instances are known of bottles having twice traversed the Atlantic and Pacific oceans before being finally stranded.

The bottle in question, however, was committed to the deep somewhat to the south of New Guinea. Here it was at once in a sea of troubles arising from westerly currents and S.E. and N.W. tides, the latter flowing and ebbing irregularly at a rapid rate and the former with varying velocity. We are now confronted with some difficulty. The tides, as stated, change their direction irregularly, and the times of high and low tide among these islands cannot be predicted; but there can be no doubt that a floating substance would be carried backwards and forwards by them. How then did our waif get beyond their influence? To answer the question we must enunciate two theories.

In the first place let us consider the wind as a factor. During the summer months the S.W. monsoon blows strongly in the waters off the Chinese coast. Towards October the N.E. monsoon increases in force until December and then lessens about February, when a period of irregular N.W. winds sets in, and then the S.W. monsoon takes its place, develops strength, and effects a considerable diversion of tides and currents amongst the islands. These winds would act on any floating body, and would, at times, have sufficient force to overcome the action of a contrary current, and even to drive such a body across it, especially as some of the known ocean currents sometimes decrease in velocity, and indeed almost cease to be observable.

In considering the probable journey made by the waif before us it is then absolutely necessary to take the monsoons and trade winds into consideration, otherwise we are forced to a very hypothetical conclusion, which I shall revert to by-and-bye. When we come to the tides and currents circulating among the islands of Polynesia it must be borne in mind that the irregularities of the ocean bed, the presence of numerous islands, reefs, and shoals, the different width of channels and straits, the more or less abrupt incline of the coasts beneath the waters, and many generally unknown local circumstances will profoundly modify the regularity of the great tidal wave. And here we are faced by a serious difficulty in the determination of the course of the "'Harrier' waif," presuming that it was actually two years floating in the ocean. Perhaps, as it drifted gently along towards the N.E., it was suddenly seized by the impetuous rush of an unknown current or "race" as it passed a group of islets;

perhaps it encountered a swirl and was for many days or weeks detained performing a monotonous circular journey like the weed in the Sargasso Sea. These are possibilities upon which no light can yet be thrown, because we are still greatly in the dark as to the movements of the sea in those regions, in so far as we leave the track of the well-known and well-defined currents. Captain Pennefather, whose long experience of Torres Straits entitles him to be considered a good authority on the subject, states that the tides there are erratic, violent at times, and cannot be depended upon at any time. Thus we must leave to conjecture the movements of the bottle during part of the two years which elapsed between December, 1890, when it was thrown overboard, and October, 1892, when it was picked up on Mille Island, in the Marshall Group.

I now come to consider the more probable of the two theories I have formed as to the course taken and the distance run.

The spot where the bottle was sent adrift by Captain Michael lies in latitude 11deg. 26min. South, longitude 147deg. 30min. East, and the place where it was picked up by a native is on Mille Island, one of the Marshall Group. That island lies in latitude 6deg. 10min. North, longitude 171deg. 40min. East, as given by Captain Geo. F. Garland, of the American missionary steamer "Morning Star." This shows that the distance made in longitude was 14deg. 10min. or 850 miles and in latitude 17deg. 36min. or 1,056 miles, or about 1,906 miles in a N.E. direction. Supposing the bottle could have travelled in this direct line with a current unaffected by tides and winds and averaging two miles an hour, the time required to make the voyage would have been 678 hours or four weeks six hours. Suppose such a current to run only 12 miles a day the time would have been 16 weeks and a day. But, as already mentioned, a variety of impediments lay in the way.

The first to be reckoned with is the S.E. trade wind, which would probably have the effect of increasing the velocity of the Equatorial current (Rossel's current) as it rolled on through the Louisiade Archipelago and past the coast of New Guinea. The Marshall Group lies on the other side of this current. How then can we account for the arrival there of our wandering messenger? How did it cross a current which should have

carried it in an opposite direction? The probabilities are all in favour of its not having crossed any adverse current, but of its having been driven by some current favoured by westerly squalls towards the China Straits, where the S.E. trade wind drove it into the influence of the northerly branch of the Pacific Equatorial current, by which it would be carried along in a N.W. direction by what is called Rossel's current, past the Bismarck Group, possibly as far west as 140deg. east. Thence, as it could not be drawn into the north-east current, rushing to join the Japan current or Black Stream of Japan, by which it would either have gone by Behring's Straits to the Arctic Ocean, or would have returned across the Pacific towards Vancouver Island by the Japan current drift, and so back across the Pacific to recommence the voyage. Its only other course would be to enter the return easterly current which flows between the north equatorial and south equatorial currents, and thus passing between the Caroline and Marianne islands it would finally reach the Marshall Group, where it was found. Now, such a voyage would cover about 4,900 miles, and allowing a mile an hour for its onward rate of travel we arrive at a little over seven months for its duration, a long way short of two years. Allowing a drift of twelve miles per day we get a voyage of about 14 months. Still, when we remember that if the winds blow in one direction the surface water is impelled in the same direction, and therefore a north-westerly drift current might be set up by the S.E. trade wind, and that wherever a current runs in one direction a counter current runs in the opposite direction, in order to preserve the equilibrium, we may form some idea of the retarding causes acting upon the waif under consideration. Now, although we may have some difficulty in arriving at a really satisfactory conclusion as to how the bottle got away to windward and passed through the Louisiades in order to reach the current setting N.W., the fact remains that it did so, otherwise the second but very improbable theory comes into operation.

In support of this theory we must admit the possibility of the bottle travelling westward beyond the 130th meridian, when it would, after passing the Philippines, be carried by the Japan current to latitude 45deg. North; thence along the North Pacific drift current to 150deg. West. Then it would turn south, run

down the west coast of North America, when it would encounter the Pacific Equatorial current and, turning west, would drift as far as 140deg. east, when it would return and pass through the Caroline Islands and thus reach the Marshall Group. As for the time which elapsed between the throwing overboard of the bottle and its recovery nothing can be said but what must be patent to every one, and that unknown influences came into play to retard the voyage.

Captain T. Almond has kindly given me the particulars of a voyage performed by a buoy which was thrown overboard from the Union Steamship Company's s.s. "Alameda," off Lord Howe Island, in latitude 34deg. 2min. South, longitude 157deg. 55min. East, on July 24th, 1891, and was picked up early in March on the beach near the Sand Hill Hotel, at the Burnett Heads. There were no barnacles on the buoy, but a few limpets had gathered on its surface, which goes to show that it had not been in the water for any length of time. Captain Almond, who was on the spot at the time, had the buoy sent up to town. The captain of the "Alameda," writing on the 24th March, 1892, stated that the buoy was thrown overboard as above stated, equal to 214 days making a drift of north 23deg. west—about 612 miles.

Now the buoy when thrown overboard was at once under the influence of the Antarctic current flowing to the N.E. past the west coast of New Zealand. This current gets weaker as it proceeds northward, and the S.E. trade wind, acting upon the large exposed surface of the waif, undoubtedly drove it into the southerly branch of the Equatorial current which runs down the Australian coast from the direction of New Caledonia. It would strike this current in about 25deg. south, and by it would be drifted into the Australian coast, where it was found, after an approximately estimated voyage of 1,750 to 1,950 miles, at an average rate of seven miles per day.

From what I have been able to elicit concerning the currents of this part of the world it would seem that, even amongst ship-masters who frequent these island-dotted seas, much diversity of opinion exists, and naturally so when it is considered that neither

currents, tides, or winds are constant or regularly periodical, except of course in the case of the trade winds, monsoons, and well-defined currents. Much has to be learnt about them, and until reliable records are obtainable many questions, and especially the apparently erratic voyages of ocean waifs, must be open to argument.

The paper was illustrated by a large chart showing the ocean currents. An interesting discussion followed, in which the President, Mr. O. C. Smith, and the Hon. Secretary took part.

ANNUAL MEETING.

The ninth Annual General Meeting of and Conversazione in connection with, the Royal Geographical Society of Australasia, Queensland Branch, was held in the rooms of the Society, old Education Office, William street, Brisbane, on the evening of Thursday, July 12, 1894, at 8 o'clock. The attendance was large and fashionable, and amongst those present were His Excellency the Governor, Lady Norman, and Miss Grace Norman. The chair was occupied by the President, J. N. Waugh, M.D., and he was supported by His Excellency General Sir H. W. Norman, the Hon. A. C. Gregory (a Past-President of the Society), Major A. J. Boyd, Messrs. John Mathieson, J. Fenwick, C. B. Fletcher, W. Soutter (members of the Council), and the Hon. Secretary, Mr. J. P. Thomson.

The President, in opening the proceedings, expressed pleasure at seeing so large and representative an attendance.

Letters of apology for non-attendance were read from the Ministers of the Crown, the Supreme Court Judges and others.

Elections.—Ordinary Members: Messrs. W. Aitchison, A. M. Hertzberg, H. Macintosh, G. S. Matthews, J. Munro, T. Mylne, C. J. W. South, Edgar W. Walker, A. D. Walsh, and Capt. E. C. Owen.

On the motion of the Hon. Secretary, seconded by Mr. J. Fenwick, it was resolved, "That Clause 32 of the Constitution and Rules of the Society be amended by adding after the word 'arrears,' in the seventh line the words 'or such compromise as may seem adequate,' and that the word 'may' be substituted for the word 'shall' in the fourteenth line."

Report of Council, Session 1893-94.

The Council has the honour of submitting to the members of the Queensland Branch of the Royal Geographical Society of Australasia the ninth Annual Report upon the operations of the Society during the preceding year ending June 30, 1894.

Two Hon. Corresponding and five Ordinary Members were elected. The Society sustained the loss of two valuable and respected supporters, Messrs. Thomas Scott Bailey, of Brisbane, and William Mune, of Fiji, whose death it is the Council's regretful duty to record.

The Council submits the subjoined Financial Statement :—

ROYAL GEOGRAPHICAL SOCIETY OF AUSTRALASIA (QUEENSLAND BRANCH).

FINANCIAL STATEMENT FOR THE YEAR ENDING 30TH JUNE, 1894.

Dr.	£ s. d.	Cr.	£ s. d.
To Balance from 30th June, 1893	88 9 6	By Printing the "Proceedings and Transactions" of the Society	44 13 0
" Annual Subscriptions, etc...	75 2 0	" Printing Circulars and Post Cards, and the purchase of Stationery, &c.	20 8 2
" Entrance and Diploma Fees	6 5 0	" Caretaker of Museum for attendance	1 10 0
" Sale of Publications, &c. ..	4 2 0	" Advertising	0 19 0
		" Contribution to United Service Club for attendance, gas, &c.	7 10 0
		" Furnishing Library	8 14 0
		" Fire Insurance on Library..	2 15 0
		" Private Letter Box	1 10 0
		" Sundries..	3 10 3
		" Balance 30th June, 1894— Government Savings B'nk .. .. .. £50 0 0; Queensland National Bk. £32 9 1	82 9 1
	£173 18 6		£173 18 6

CHARLES B. LETHEM, *Hon. Treasurer.*

I have compared all the Vouchers, Cash Book, and Bank Pass Books, laid before me by the Hon. Treasurer, and found same correct.

WARREN WEEDON, *Hon. Auditor.*

BRISBANE, *6th July, 1894.*

Besides the ordinary expense of printing and publishing the volume of "Proceedings and Transactions," general printing, stationery and postage, an additional expenditure was incurred in removing into our new quarters, in office furniture, putting up bookshelves, insurance, and in the payment of an annual amount of £10 to the United Service Institution.

The Council desires to offer its best thanks to Mr. Warren Weedon, Hon. Auditor, for past services in examining the accounts.

Meetings of Members.

Seven meetings of the members were held during the Session. The papers read at these, although not so numerous as formerly, were especially valuable and of very great interest. To the authors of these the Council desires to offer its cordial thanks. At most of the meetings the attendance of members and their friends was very good and the interest manifested in the proceedings highly satisfactory.

Council Meetings.

The Council held twelve meetings for the purpose of conducting the general business of the Society; these were remarkably well attended. During the earlier part of the Session the Council was invited by the local Committee of the Australasian Association for the Advancement of Science to submit the names of two members of the Society for the positions of a Vice-President and Secretary of the Geographical Section of the Association. Messrs. D. S. Thistlethwayte and A. J. Boyd were chosen and subsequently appointed.

Purlications.

The demand for the current and back numbers of the Society's volume of "Proceedings and Transactions" has been far greater during the Session than heretofore. Besides numerous applications from kindred institutions, Government Departments and other public bodies all the world over, several complete sets have been supplied on special application to booksellers in Europe and Australasia. While this increasing interest in the literature of the Society is very gratifying as affording unmistakable evidence of its value as a reliable and trustworthy record of geographical information, the Council desires to state that the earlier volumes are becoming very scarce, and should the demand continue to increase it will be necessary to print a larger edition than is done at present.

Library.

The library has been enriched by many valuable additions consisting of exchanges from cognate bodies, foreign and colonial Governments, and gifts from private donors. In acknowledging these the Council desires to offer its very cordial

thanks to His Excellency the Governor for handsome gifts of books.

At the beginning of the Session a communication was received from the Hon. the Secretary for Public Works stating that "he had allotted four rooms situated in one wing of the old Education Office, William street, to the United Service Institution, conditionally that the Royal Geographical, Royal and Medical Societies are allowed space for their libraries and free access for meetings when required in the long room facing William street." At a preliminary meeting of representatives it was agreed that the small room in the wooden building facing George street should be devoted entirely to the use of the three Societies for library, writing and reading purposes, and that the long room should be used for general meetings only. After this arrangement had been made the Royal Society withdrew, leaving the Medical Society and ourselves in possession of the small room, the half of which does not afford adequate space for our books and maps. The accommodation is, however, of great value to the Society and advantageous to our members, who have ready access to the library and ample facilities for reading and writing. It was subsequently agreed by the Council that our Society, although tenants of the Hon. the Secretary for Public Works only, should pay an annual sum of £10 to the United Service Institution for attendance, wear and tear of furniture, gas and cleaning. The Council is happy to report that so far the arrangement has given general satisfaction.

For the Council.

J. P. THOMSON,

Hon. Secretary.

His Excellency the Governor, in moving the adoption of the report, congratulated the Council of the Society on the very satisfactory nature of its statement. He thought they owed a great deal to the officers who had brought about the very desirable result—a result which could not have been achieved without considerable difficulty. He had not anticipated that there would have been such a substantial balance in hand after the amount of work that had been done and the printing that had been undertaken. They must all feel gratified that ten new members had joined the Society that night. He hoped many

more would join during the year, for there was ample scope for increased interest in the work of the Society. They had much to learn from a geographical point of view concerning this colony and the islands in the neighbourhood of the colony, and he trusted that all who were there that night, and many who were outside (ladies as well as gentlemen), would do much to encourage the operations of the Society. He desired, on the part of those who had attended the meetings and read the proceedings, and knew what had gone on, to express thanks to the President and to the Hon. Secretary of the Society. Presidents they knew could not go on year after year, but with secretaries it was somewhat different. They had never had a secretary who had exerted himself so much in the interest of the Society as Mr. Thomson had done, and a great deal of the success achieved was due to him. He (His Excellency) had had occasion to have various communications with their Secretary, and he was sure he had constantly taken an interest in the wellfare of the Society and in the furtherance of geographical knowledge. (Applause.)

The Hon. A. C. Gregory, in seconding the motion, entirely concurred in what His Excellency the Governor had said respecting the value of Mr. Thomson's labours as Hon. Secretary since the foundation of the Society, and expressed satisfaction at the success attained during the past year.

The motion was carried.

ANNIVERSARY ADDRESS.

Commercial Geography.

By J. N. Waugh, M.D., Etc.,
President of the Society.

In throwing together a few remarks upon geographical subjects, the temptation is great to discourse upon the work done in all parts of the world by thoroughly trained men, to many of whom exploratory travel is no new thing, and who seem to almost court dangerous adventure for the mere pleasure of coming out of it with flying colours. If lofty mountain ranges are to be scaled and examined with more or less scientific accuracy, river

sources to be traced and truly located, glacier formations examined, and the practicability or otherwise of boundary passes ascertained, men come forward cheerfully and readily, and leaving behind them all that less energetic men covet, throw themselves heart and soul into the work with that pluck which almost commands success. We are but a young community and cannot hope to vie with those of the older countries; still we have our mission. I propose on this occasion to bring to your notice what, most certainly, concerns us closely—the necessity for, or, at any rate, some of the advantages that accrue to us from a more extended knowledge of that phase of geography which more particularly bears upon industries and commerce. There are many excellent treatises and handbooks published upon these subjects easily procurable.

Geographical research by regularly appointed expeditions, or by private enterprise, may be undertaken from love of gain, love of power, or from zeal for science, where men, from intense desire to acquire knowledge, will brave any danger in the pursuit. With the first motive we are more immediately concerned just now, for while in every expedition there may be found individuals who are actuated by other motives, still the question which the people at large ask, when called upon to provide the means for carrying out a proposed work, is, Will it pay? In making this assertion, I am very far from imputing mere mercenary aims to those brave and dauntless men, who, having thoroughly qualified themselves for the work of scientific exploration, offer their services to their country, or to societies of men who wish some work of geographical exploration carried out in the best possible manner: but it is certain that it would add much to the praise bestowed upon their success if it could be shown that, in addition to the scientific work, commercial effort had been greatly stimulated, and the trade of their country, as one result of their efforts, much increased.

Commercial geography treats of the production of the raw material, which, if not converted into useful form in the country which produces it, is exported to another country where it is manufactured, and thence distributed to all places requiring such commodities. For it is one thing to grow raw material and another thing to manufacture it into forms suitable to the require-

ments of purchasers. After these industries have played their part, the commercial phase of distribution and of buying and selling comes in. It is manifest that different classes of men will be required to carry out successfully these different operations. Just as a miner, engaged in sinking mine shafts, hewing coal, or mineral ores, is not necessarily acquainted with the science of chemistry, which is required for the reduction and smelting of such ores ; so is the smelter or refiner not of necessity a person to whom would be entrusted the office of ascertaining the best market, and of arranging for the distribution of, and general commercial dealings with, the finished product.

We thus arrive at the division of geography in this view into industrial and commercial.* It will be evident to all that a mere topographical description of a country will convey but a small amount of the information necessary to constitute commercial geography. In the first place, we require a museum, in which may be seen and examined not only the raw materials grown in any given country or place, but also the manufactured articles, so that a teacher may be able to explain to some extent the processes of manufacture. This, you will see, would involve a history of industry and commerce. Such an establishment would manifestly be a function of government ; not to provide the means of acquiring a mere accomplishment or educational polish, but to afford information upon subjects absolutely necessary to our well-being and progress as a commercial people, and to enable us to hold our own with other communities who habitually make these matters objects of special study. It is not sufficient to say, "Our fathers did very well without such study." Our fathers, in forming the East India Company, laid the foundation of the British Empire in India, and this, by strict attention to economic laws, among a people who knew little or nothing about such things ; but in these days we live under very different conditions. Surrounded by keen observers, each nation striving to outrun the other in the race for commercial supremacy, it behoves us so to train ourselves and our children, as to give a good chance of winning. I think we may resolve that the study above referred to is not only advantageous but absolutely necessary. We have seen that topography forms but

* Journal of the Manchester Geographical Society, Vol. II.

a comparatively small factor in the study of commercial geography, although it is, of course, essential. We must study the physical features of the country—the height and general character of mountain chains; river systems, as to their being navigable or otherwise, and what facilities they afford for irrigation, their liability to floods; the extent of plain country, character of soil, with geological details sufficient to guide the well-informed immigrant as to its fitness for growing grain or fruit, or for stock-raising, &c.; the extent and features of lakes and swamps; climate—as to temperature, the average register of thermometer during Summer and Winter, the liability to sudden or severe frosts, or drought; rainfall average during the year, and at what seasons it usually occurs, and the average number of rainy days; prevailing winds, whether dry or moist, and as many details as experience can afford. Details as to the mineralogical features of the country, the presence of metallic ores, coal, or gem-bearing drift, distance from a market, facilities for transport and cost—for freight, more than distance, is the chief mercantile consideration. As an instance of this statement, I may mention that the cost of carrying a bale of wool from Australia or New Zealand to London is little more than that of carrying it from London to Leeds or Bradford, or to Scotland, and a remark made a short time ago by a Russian consul was to the effect that wheat could be imported from Australia into St. Petersburg at a rate cheaper than from Southern Russia. These considerations bear more particularly upon emigration; but for general commerce we must gain information as to the political condition of the country, its form of government, and stability or otherwise; its imposts; the amount of security and protection afforded to traders; the general character of the inhabitants, and the laws relating to foreign commerce; the different currencies, weights and measures, with their English equivalents. This branch of geography embraces also a knowledge of the general trade routes and centres of traffic, and the policy of nearly all foreign countries regarding commercial intercourse. These trade routes, which used to be in former days so very much influenced by the natural features of the earth's surface, are often much modified by perturbing causes. For instance, in our own time, by the opening of the Suez Canal,

commerce which used to follow Cape of Good Hope route to London now follows the Suez route to the Mediterranean, involving great loss to England. Thus any change of route will, of necessity, make a change in the centres of trade. Russia's Siberian Pacific Railway must change to a great extent the trade route from China to Europe, and open up rich marts in Siberia, increasing Russia's resources as a maritime power, and giving her far more influence in treating with China upon commercial lines; and we may see Vladivostok assuming great commercial as well as strategical importance, when this line connects St. Petersburg with the Pacific, for when completed, this railway will doubtless draw to the new route a portion of the trade traffic which is now carried by the United States and Canadian lines. However, in this respect, the Canadian Pacific has the start, and will, when steam communication with these colonies and Vancouver is established, make a marvellous change in Australian commerce.

But while we see great undertakings of this sort, when carried out successfully, changing the course of commerce, we also see how difficult a task it is to alter trade routes marked out by nature, as when small communities or even nations try, by imposts, and other means, to divert trade into artificial channels. We do now and then see a trade route apparently changed by an importing country growing for herself what she formerly purchased from a stranger; but this is rather blocking up a route. We find an instance of this in India supplying herself with the large quantity of cinchona required in her hospitals, and even exporting quinine. This was brought about by sending to Peru and the Valleys of the Andes, agents, who, after acquiring a knowledge of the preparation of the raw material, introduced the cultivation into India, which country thus became no longer dependent upon foreign sources. The growth of tea in the Indian provinces of Assam, Darjheeling, Cachar, &c., is another instance. For we find that in 1883, China supplied England with 72 per cent. of her tea, while other countries under the British flag supplied only 28 per cent. In 1892, British dependencies supplied 76 per cent. and China only 24 per cent., and the supply from British dependencies came in at a lower price, thus enabling the poorer classes to consume

immense quantities of this luxury. Ceylon, in 1893, exported 84¼ millions of pounds of tea, of which 83 millions went to the United Kingdom and to Australia, and only one million to foreign countries, both producers and consumers being under the one flag.

We need hardly refer to the suggested canal through the Isthmus of Panama, or indulge in any prophecy as to its effect upon the commerce of Europe and of all the Pacific ports of America. For instance, the distance from New York to San Francisco, by the Cape Horn route is 15,900 miles, which distance would be reduced to 4,200 miles were this canal opened for traffic.

Again, the submarine telegraph, with the necessary deep-sea soundings, at comparatively short intervals, and the great discoveries made thereby—how greatly has this enlarged our knowledge of oceanography and at the same time modified trade transactions.

In Central Asia, Russian rails, creeping eastward, are approaching the Chinese frontiers, and although in regard to Russian posts it is merely a matter of military occupation at present, new trade routes will soon be established, and some old ones probably re-opened.

British occupation is also extending eastward in Burmah, which, with the French operations on the Me-kong and Japanese interference in the Corea, will probably waken up China to some further freedom of "commercial intercourse." In fact, to the wish to establish trade relations with her, as well as to obtain strategic positions, may be attributed much of the aggressive attitude in those parts at the present time. But such has ever been the case, even from very early days. Phœnicians (merchant sailors) had, at a very remote period, many colonies in the Mediterranean, and beyond the Straits of Gibraltar, at Gades (Cadiz), even visiting Britain, where they procured tin.

The expedition sent by the Egyptian king, Necho, which sailed down the Red Sea, rounding the Cape of Good Hope from the eastward, circumnavigating Africa, and returning after an absence of more than two years through the Straits of Gibraltar to Egypt, took place more than 600 years B.C., and was sent no doubt

with a view to more than mere extension of geographical knowledge; but it had, so far as we know, no permanent result. In fact, Herodotus says plainly that he does not believe the statement made by the men who, on returning from this long voyage, said that, as they sailed round Libya, they had the sun on their right hand. We find, however, other evidences of ancient voyages of Phœnician merchant vessels, which have left, according to the views of some travellers, marked traces of their route. Some of you may have read the very interesting account given by Mr. Johnston, in the *San Francisco Geographical Journal*, of the finding of "sacrificial stones" on some islands in the Pacific Ocean, in a more or less continuous chain, right across to the Western coast of America, and thence inland to Yucatan and Guatemala. These stones are attributed, upon fairly satisfactory evidence, to Phœnician travellers, who, subsequently, introduced civilisation into America from the westward, entirely different from that introduced by the followers of Columbus from the eastward. This evidence is based upon hieroglyphic markings upon the stones, partaking of a mixture of Egyptian and Assyrian characters, which we need not discuss in this paper. It is supposed that the voyagers came into these seas by sailing down the Red Sea, standing across to India, down the Malabar coast, round Ceylon, across the Indian Ocean and through the Straits of Singapore, or some of the southern straits, into the Pacific. For we find in the Book of Kings, that King Solomon built a navy of ships at Eziongeber, on the shore of the Red Sea, at the head of the Gulf of Akaba, and that Hiram, King of Tyre, sent seamen to help man the fleet, and that the fleet of the two kings made voyages of three years' duration, bringing back gold, silver, ivory, apes, and peacocks. Now it seems that with these recent discoveries in our more immediate neighbourhood, which can be re-examined and verified, we may reasonably accept this route as being at least quite as practicable as the other asserted route, viz., by making up caravans at Tyre and Sidon, travelling eastward to the River Euphrates, sailing down that river to the Persian Gulf, and along the coasts of Beluchistan and Cutch, to India, and thence returning by running down the north-east trades to Upper Egypt, journeying across country to the River Nile, descending that river, and by sea regaining their point of

departure. We thus see, at any rate, that the Suez Canal has re-opened a very old trade course, so far as the Indian Ocean is concerned, and that Polynesia was, in all probability, visited long ago by merchant sailors and explorers, of whom we have but few traces in history. To return to our own times:—Our recently acquired territory in New Guinea may afford us an example of exploration carried on with a view to commercial advantages, although at present in the infancy of development. There seems but little doubt that gold-bearing country will be discovered there ere long: in which case, the large influx of Europeans would soon cause a trade to spring up, and we may congratulate ourselves that our New Guinea neighbours are being well prepared for such a change, by the excellent, kindly, and wise government of Sir William Macgregor.

In less frequented, but not less interesting regions of the earth, we find Nansen undertaking a most venturesome task, viz., to prove whether or not currents in the North Polar waters will carry his ship across the Arctic Sea, in latitudes higher than any yet arrived at.

Our Antarctic Polar regions, while affording a most extensive field for the scientific research which we all hope to see resumed in a short time, can hardly be expected to prove profitable from a commercial point of view. The climate is so rigorous that we find no land animal nor any trace of vegetation, not even a lichen or a piece of seaweed, on any land within the Antarctic circle, where the thermometer never, even in Summer, rises above the freezing point of fresh water. As a contrast to this climate, Peary relates that in his Arctic expedition, in which he proved the insular character of Greenland, he found in latitude 81 deg. 37 min., in the month of July, "fine genial summer weather; many flowers in bloom, butterflies, bees, and innumerable flies, musk oxen in numbers, and, 100 miles inland, several puffins."

We may, in conclusion, just glance at Africa, where we see an absolute scramble for the possession of a share of that continent. These different annexations along the whole seaboard are already stifling the hideous slave trade on the east coast: while the old centres of the slave traffic on the west coast have entirely given it up for the more profitable trade in palm oil and for

general commerce, and this commerce will now make rapid strides, as the fertile country in the interior, beyond the fever belt of the low-lying coast lands, becomes well-known and opened up to European enterprise and the exercise of the trading instinct.

You will see that I have not attempted to write a treatise upon commercial geography. I have simply ventured to make a few remarks upon it, and upon the expediency or necessity of a thorough teaching in our schools of this somewhat neglected subject.

On the motion of Major A. J. Boyd, seconded by Mr. W. Soutter, a vote of thanks to the President was carried by acclamation, and it was resolved that his address be printed in the "Proceedings and Transactions" of the Society.

The scrutineers, Messrs. P. McLean and R. H. Lawson, announced that the ballot for the officers and council of the Society for the Session 1894-95, had resulted in the unanimous election of the following gentlemen:—President: Mr. J. P. Thomson, F.R.S.G.S., F.S.Sc. (Lond.); Vice-President, Mr. C. B. Fletcher; Hon. Treasurer, Mr. C. B. Lethem; Hon. Secretary, Mr. John Fenwick; Members of Council: Dr. J. N. Waugh, Dr. Hardie, Major A. J. Boyd, Messrs. D. S. Thistlethwayte, A. Gibb Maitland, F.G.S., W. Soutter, John Mathieson, and Ormond C. Smith; Hon. Auditor: Mr. Alex. Muir.

Votes of thanks were accorded to the retiring Council on the motion of Messrs. P. M'Lean and R. H. Lawson, to the Hon. Treasurer on the motion of Messrs. J. Mathieson and C. B. Fletcher, and to the retiring Hon. Secretary on the motion of Dr. Waugh.

In taking the chair, the President acknowledged the kind manner in which his name had been mentioned. Since its inception he had laboured in the interests of the Society, and with singleness of purpose. In acknowledging the cordiality on the part of the meeting he would be lacking in his duty were he not to mention the very great assistance and sympathy of His Excellency the Governor. He had received very great encouragement indeed—quite unknown to ordinary members, and in relinquishing his secretarial duties he desired to make the acknow-

ledgement. He craved a continuance of that kindness for his successor. He also referred in pleasing terms to the assistance always rendered by the Council and Officers and by the Past-Presidents, especially the Hon. A. C. Gregory and Dr. Waugh. He thanked the members for his election. He announced the appointment of Major Boyd as honorary librarian, and called upon the newly-elected officers to accept their positions.

Messrs. Fletcher, Fenwick, and Boyd briefly returned thanks for their election.

The President moved a vote of thanks to His Excellency, Lady Norman, and Miss Grace Norman for their attendance, remarking that the Society had been greatly honoured and its position strengthened by their presence.

Sir Henry Norman, in reply, thanked the President for his kindly references to himself and to Lady and Miss Grace Norman, and the meeting for the hearty way in which the vote of thanks was carried. Personally, he had always taken the greatest possible interest in everything connected with geography. He might, indeed, reveal the secret that the only prize he ever gained at school was one for proficiency in the knowledge of geography. (Laughter and applause.)

The remainder of the evening was devoted to social intercourse, refreshments being served out and harmony indulged in.

COMMERCIAL GEOGRAPHY.

About the commencement of the year (1894) arrangements were made by the Council to institute and conduct a class of Commercial Geography at the Brisbane Technical College, under the auspices of the Queensland Branch of the Royal Geographical Society of Australasia. In the first instance attention was drawn to this vitally important and much neglected department of Geographical Science by His Excellency Sir H. W. Norman, who, on the occasion of the annual distribution of prizes to the college students, regretted that the committee of the institution had not been able to establish a class of commercial geography. For some time previously the Council of the Queensland Branch of the Royal Geographical Society of Australasia had, however, been endeavouring to arouse an interest in geographical education in Brisbane, and with that object in view the co-operation of kindred institutions in Great Britain had been solicited.

The Hon. Secretary of the Society, Mr. J. P. Thomson, was entrusted with the initiation and conduct of the movement, and he arranged to deliver a series of fourteen lectures, based upon the lines laid down, and successfully followed, by the Geographical Societies in Europe in connection with their schemes of Geographical Education in the universities, colleges, and secondary schools.

The following Introductory Lecture was delivered at the Brisbane Technical College on Thursday evening, May 17 :—

THE GEOGRAPHY OF COMMERCE.

By Mr. J. P. Thomson, F.R.S.G.S., &c.

Nearly the whole period of man's existence is occupied in acquiring the necessary life-sustaining substances. Shortly after birth there arises an instinctive craving for food, and this desire continues with more or less intensity during life—it is simply a natural effort to sustain life. Although this is the case with all living organisms the circumstances environing the life of civilised man impose greater responsibilities, place him in need of

many more requirements, and render life's struggle fiercer than that of any other member of the animal kingdom. Man, while pre-eminently the most perfect type of the higher forms of life, both intellectually and physically, is associated with conditions that render an application of the faculties necessary in sustaining life and providing such commodities as are needed to meet the requirements of civilisation. It is these problems of real life that force themselves upon the attention of man, and it is to their solution the lifelong energy and ingenuity of the race are directed.

Before proceeding farther it must be clearly understood that the conditions of climate and the configuration and physical features of the earth exercise a powerful influence on the race. Not only are they potent factors in the production or modification of racial distinctions, but they very largely control the production and distribution of commodities, and thereby render their consideration necessary in studying the fundamental principles of commercial geography. A very brief survey of the climates and physical conditions of our globe will at once show how this is brought about. Commencing with the frigid zones, we find the rigorous climatic phases render life's struggle great; vegetable food is scanty, and these eternal ice-bound regions offer but few facilities for the development of extensive commercial enterprises. It is only during certain seasons they are at all accessible by the great ocean highway, and the lowly inhabitants eke out a miserable existence under conditions unknown to the races of warmer and more congenial climes. In these inclement latitudes, too, there is great paucity of animal life. Birds of brilliant plumage are not met with; insects are scarce and of limited variety; and there is little within these dismal regions to break the pervading solitude. Man under these conditions sympathises with the inhospitable surroundings; his intellectual capacity is small; physically he is inferior to the predominating races occupying more congenial climes; and, moreover, he is not far removed from the state of cannibalism. Indeed, it has recently been pointed out by the learned president of the National Geographic Society at Washington, Hon. Gardiner G. Hubbard, in his annual address to that institution, that "the nearer man lives to the polar regions the greater his inferiority in intellect, the greater his barbarism."* It will thus be seen that with a race of people so far removed from civilisation, and existing under the boreal conditions of eternal ice and snow, no extensive trade can be established. We may in some measure utilise these remote dwellers as hunters, and a moderate industry may be carried on in these high latitudes in oil, fur, ivory, and in fishing, but these in time must become exhausted, and there being little or no demand for our surplus commodities trade will necessarily decrease, and eventually end altogether. We can then picture the wretched inhabitants cut off from all intercourse with civilised man, shut up in the solitude of long wintry darkness grasping the cold relentless ice hand of death.

In the temperate zones the conditions of life are altogether different. Here we meet with congenial clime and fertile soils. The great valleys, river basins, and steppes are peopled with agricultural and industrial races;

* The National Geographic Magazine, Vol. VI., p. 1.

the mountain chains and rivers determine limitations of national and political boundaries between countries and states; the grand trunk railways and maritime service facilitate and foster intercommunication, and everywhere news is disseminated by the great nerve system of telegraph and cable. The enormous manufacturing centres transform the raw materials into articles of commercial utility, and those not actually required for home consumption are exported to other parts of the world where markets have been established. To facilitate free and ready intercourse commercial relations have been entered into between foreign countries, and certain national agreements are from time to time being brought about, mutually advantageous to all concerned. These, too, are the great temperate zones of the earth dominated by science, literature, and art, for in no other regions is the intellectual standard so high nor civilisation so far advanced. It is within these favoured latitudes that the great commercial emporiums of the world are also situated, huge enterprises developed and industrial progress maintained. Impelled, or stimulated, by pressing circumstances, the peoples of the temperate zones have acquired the art of adaptation to surroundings; they are far seeing, self-reliant, shrewd, and enterprising, and the love of gain and desire for power have urged them to extend their influence to all parts of the globe and to dominate inferior races. From east to west and from north to south the wave of life is constantly spreading; new countries are acquired, opened up, and peopled by the ubiquitous pioneers of civilisation and heralds of commercial enterprise. The higher the order of civilisation the greater the struggle for life, the heavier the responsibilities, and keener the competition. The inventive faculties of man are called into requisition and experiments conducted with the view of minimising labour, economising and conserving energy, and utilising the products of the soil to the best advantage. These efforts are being largely aided by steam and by electricity; the former has reached a stage of marvellous development, while the future possibilities of the latter are as yet unknown. Fast ocean-going steamers are daily despatched from the shipping ports of Great Britain and from other parts of Europe with passengers and freight to America, India, Africa, Australia, and other countries. Most of these vessels are fitted up with commodious cold storage chambers for the carriage of frozen meats and fish for British markets, and so large is the increasing demand for these staples of food that the consumption is greater than the supply, and this circumstance has induced steam shipping companies to consider the best means of improving the refrigerating capacity of their steamers, whilst meat export companies have recently been established in Queensland, New Zealand, and other ports, where enormous quantities of frozen meats are shipped for the home markets. These great enterprises have not only been the means of creating a most profitable national industry, remunerative to the shipping companies concerned in it, but they have given an enormous impulse to the commercial life of the colonies, and have, moreover, inspired producers with increased confidence in the possibilities of the future, as well as having drawn the attention of

other countries to the vast resources that we possess. Everywhere within these temperate zones, there is a constant effort to carry new enterprises to new countries, and to foster trade relations with foreign parts that lie within themselves and within the other less favoured regions of the globe. For this purpose international trade policies are carried out and contracts entered into. The imposition of heavy duties on foreign imports has probably hindered the development of commercial enterprise, and rendered the interchange of commodities between nations and even neighbouring states and colonies somewhat difficult in some cases, while in others it has actually been prohibitive. Enlightened public men have, however, recognised that the resources of a country can only be adequately developed by the circulation of capital, by the establishment, and encouragement of new industries, and by the ready interchange of commodities. To accomplish these there is an ever-increasing desire to disseminate reliable information concerning young and remote colonies, as well as to foster closer relationships on a federal basis between distant parts of the Empire, and to encourage free intercourse with foreign States.

The next and final division of the globe that claims attention lies within the torrid zones ; here the most primitive types of the human race are met with, barbarians and cannibals, the most powerful and ferocious animals, wild and unapproachable ; huge and venomous reptiles of various types and orders ; dense and luxuriant vegetation ; in fine, these terrestrial regions teem with unsurpassed wealth of animal and vegetable life. The soils are pre-eminently rich and fertile, and the country the most abundantly watered on the face of the earth. Lofty snow-capped mountains rear their heads far above the 16,000ft. level, and mighty rivers meander through impenetrable forests and through vast tracts of low swampy and malarial-infested areas. Natural products are here abundantly represented ; mineral areas are richly endowed with an unsurpassed wealth of precious metals, and primitive man under these conditions enjoys with ease many necessaries of life that are nowhere else to be found, and which are only procurable by the civilised races in other parts by great labour and at considerable cost. Whilst sparsely distributed over deserts and steppes we find the population of the earth is densely concentrated within the extensive river basins of tropical countries, where vast agricultural areas exist, and where vegetable life is consequently most luxuriant. When the colder regions of the earth are no longer capable of sustaining animal and vegetable life it is within the tropical zone that the last remnant of the human race will most probably be found. This assertion, or rather forecast, may be regarded as speculative, but when we consider that heat is the essential life-producing and life-sustaining agent, and that a future ice age is not by any means an improbability, we may claim some measure of justification in assuming that an activity of animal life will be found to exist in these tropical regions when the silence of death reigns throughout all other parts of the globe. Be this as it may, there is one thing certain that the resources of the torrid zones are great and capable of enormous development. It is upon these

resources the prosperity of the race will necessarily depend, as they constitute the essential factors in commercial geography.

Since the earliest days of the world's history man has evinced the desire to acquire wealth, and as a means of gain the ramifications of trade have been extended to all available parts of the globe. Impelled by the prospects of gain, and allured by the romance of vast wealth in foreign countries, the brave and hardy navigators of old were induced to steer their ships into dangerous channels and across unknown seas in search of an El Dorado. The Phœnician merchants, who were probably the first to recognise the advantage of extending commercial enterprises to new countries, made long and perilous voyages across vast ocean highways to the shores of unknown continents, where their commodities were exchanged for gold and silver and other precious metals. In this way new countries were discovered and peopled, vast channels for commercial enterprise opened up to the astonished gaze of the Old World. Over four centuries ago we find Columbus soliciting aid at the Court of Isabella to enable him to sail to the west, ostensibly for the purpose of discovery, but in reality impelled by the desire for gain and possibly also by the love of power. Frobisher, Drake, and Raleigh were likewise bent on similar errands when setting out on their voyages of discovery, and to open up new channels for the commercial enterprise of Britons. Thus we see that the predominating forces of man have always been and still are directed to the practical and material aspects of life, whether in acquiring knowledge to enable him to take an active part in life's struggle, or in providing food and clothing by mere physical exertion without the advantage of intellectual help.

Whilst chiefly concerning itself with merchants and with those who conduct and open up trade in home and foreign countries, commercial geography has a direct bearing upon all classes, for while the merchant supplies the wants of consumers it is obviously to the advantage of the latter to purchase at the best and cheapest markets, and as the condition of these is very largely influenced by supply as well as demand it will be readily seen how necessary it is for the merchant to know where the most suitable and best stock is to be obtained and the readiest facilities for direct importation. To the agriculturist, too; to the grazier and to the miner it is of equal importance to know how the industries upon which they depend may be profitably cultivated and developed, and this knowledge can only be obtained by systematic inquiry into the industrial aspects of the earth, the conditions of soil, climate, physical features; the peoples, their social institutions, manners and customs, and of the means of transport.

Although geographical science has always occupied an important place in the universities and other educational institutions of the continental countries of Europe, where its value as an essential educational factor has for long been recognised by all classes, it is only during comparatively recent years that the subject has found a place in the curricula of the schools and universities of Great Britain. The geography of the old school is no longer the geographical science of to-day. The old familiar system of

committing to memory the principal rivers, gulfs, lakes, mountains, capes, counties, cities, and such like, is a thing of the past, and in all modern educational courses the science of geography is taught according to method, and the system of imparting instruction is based upon a broad and comprehensive foundation. As recently pointed out by Mr. Clements R. Markham, the learned President of the Royal Geographical Society of London, "geography was the first science, the mother of all the sciences, the astronomy of the ancients being mainly mathematical geography. With the ancients as with us the work of geographers was to measure all parts of the earth and sea, and to fix the relative positions of all places on the earth's surface. Locality is the basis upon which nearly all human knowledge rests, and it is one of the priceless gifts which geography supplies to her daughter sciences."* In a young country such as ours, where a large number of the inhabitants are engaged in the pursuit of trade, it is time we recognised "the paramount importance and actual necessity of a properly organised system of mercantile or business education."† "It should be borne in mind that commercial or economic geography," as defined by the Society of Arts, London, to whom I am indebted for much useful material, "can never be satisfactorily studied without a sound knowledge of general geography, which underlies it and deals with the great permanent features of the surface of the earth's crust; their adaptability to the purposes of humanity; the uses to which Nature or man has put the surface; climate as determined by latitude, altitude, rainfall, temperature; vegetable and animal life in their broad characteristics."

Though admirably elucidated, the Society of Arts' definition of Geography is inadequate. The method adopted by the National Geographic Society of Washington represents our subject more clearly than any other system known to me. There the work of the Society is divided into six departments, represented by—The Geography of the Land; Geography of the Sea; Geography of the Air; Geography of Life; Geographic Art; and Commercial Geography. At the head of each of these is a Vice-President, whose duty it is to report annually upon the work of his department.

Considered as one of the most important departments of human knowledge, geography embraces within its scope an immense field abounding in vast storehouses of intellectual wealth for the use of mankind. Although wide in its aims, our modern geography is very clearly defined by scientifically determined boundary lines that enable us to obtain an adequate conception of the whole subject, though widely different from the Aryan doctrine of the universe, disseminated by the primitive literature of the Vedas and Zend-Avesta. Geography, like the loosely applied term Science, is a somewhat ambiguous and much abused name for the department of knowledge that deals with our world as a whole. The German designation *Erd Kundi*, though more comprehensive, is still inadequate. Perhaps "Geo-cosmological Science" would more clearly and adequately represent our branch of knowledge and give to students a more definite and comprehensive idea of the subject. The study of geography enables us to obtain

* The Geographical Journal, Vol. II, p. 519.

† See Address on "The Teaching of Commercial Geography," by Rev. L. C. Casartelli, M.A., Ph. D., *Journal of the Manchester Geo. Soc.*, Vol. II., p. 329.

a knowledge of the earth and the place it occupies in the universe: its physical features, climatic conditions, and vegetation; the air, the sea, and life (animal and human); their relations to one another, and the conditions by which they are influenced. To make a *thorough* study of our subject it will also be necessary to obtain a full knowledge of the structural elements and combination of the world: the laws that regulate its motion, their natural course and order.

The Economic or Commercial Sub-department of Geography deals with the general distribution of commodities, raw and manufactured. It seeks information concerning the commercial conditions of producing localities; the capacities of new countries for commercial development; the facilities and drawbacks to trade; the political and social conditions of foreign countries; land and sea communication; trade routes, telegraphs, postal arrangements, transports, and such like; tariffs, currencies, weights and measures. The local conditions at home and abroad have also to be considered.

In conclusion, I may point out that to successfully conduct a department of commerce the Technical College should have an industrial museum attached to it. Such a museum should be provided with showcases containing examples of raw and manufactured products arranged for ready reference to teachers and students.

The lectures were planned for the purpose of supplying information upon the Commercial Geography of Australia, and intended to form the foundation upon which a thoroughly "sound teaching of commercial geography must be built." The following is the order in which they were arranged:—

2. Australia—Physical Geography.
3. ,, Soils.
4. ,, Climate, Rainfall, etc.
5. ,, Population.
6. ,, Regions of Agriculture.
7. ,, Regions of Metal Productions.
8. Australia—Industries: Chief Productions.
9. ,, Railways and their Development
10. ,, Emigration, Colonisation
11. ,, Relative Position to other Countries,
12. Great International Trade Routes and Telegraphs.
13. The Influence of Commerce on the Development of Cities.
14. Cartography.

ERRATA:

Page 78, fourth line from bottom—For *Erd Kundi*, read *Erdkunde*.

AS OTHERS SEE US.

The proceedings at the ordinary monthly meeting of our members, held on Monday evening, August 20, 1894, at which the President read a paper on "Recent Exploration in British New Guinea," afforded the metropolitan *Press* an opportunity of referring to our field of labour and to the eminent services rendered to the Empire by our worthy associates. The following leading article, to which we refer, is reprinted from the *Evening Observer* of Tuesday, August 21, 1894 :—

The British Empire has able representatives all over the world. Australia is no exception to the rule ; and last night's meeting of the Royal Geographical Society affords the critic an opportunity of discussing some of our able men and their work. The presence of Sir Henry Norman in company with Rear-Admiral Bowden-Smith and Sir William MacGregor added a peculiar interest to the proceedings. His Excellency the Governor is an old empire builder. He knows more of the expansion of England in its practical modern details than most men, and has held a finger in directing Indian and colonial affairs for nearly half-a century. Queensland under his wise and sympathetic rule has gradually forged ahead from the dangers of "boom" shallows to the deep waters of natural production. We know that self-government may be credited with a great deal ; but Sir Henry has kept the fact of Empire before our eyes in the best possible way, by his personal qualities of tact and kindliness. The cords which bind us to the mother land have never suffered relaxation under his hand, and it only needs that we should think out the significance of this fact to accept his work at a very high value. Rear-Admiral Bowden-Smith represents the great nexus of Empire. As long as the British navy holds command of the sea there will be a continual and ever-deepening development, in spite of the narrow statesmanship sometimes displayed by prominent men at home and abroad. Compared with the state of public feeling fifty years ago we have light and liberty. British battleships are ordered across the seas as much in our interests as in those of the mother country ; and the world realises to-day that the Australian colonies are not penal settlements, but integral parts of a mighty State. Last, but not least, Sir William MacGregor is the true pioneer of Empire. He is the worthy exponent of principles without which colonisation would be impossible. His work in New Guinea is much of it on exactly the same lines as those followed by Australian explorers, of which the Hon. A. C. Gregory and his two brothers are brilliant examples. But it has more than the mere scientist behind.

Sir William is winning New Guinea for Australasia as India has been won for Great Britain. By a careful study of native life and character, and by a wise introduction of Anglo-Saxon laws and ideas, he is slowly but surely building up a British colony. He is the administrator as well as the explorer.

This development of British New Guinea has a peculiar interest for Queensland. We are not only neighbours, as a glance at the map will show in a moment, but it is owing to our exertions that Sir William MacGregor has obtained a reasonable opportunity for doing himself justice. This was very gracefully acknowledged last night. The Administrator did not hesitate to admit that the Government had helped him in every possible way. Bnt we are also under a great obligation—the acknowledgment should be reciprocal. Whatever has been accomplished in New Guinea has meant stimulus and satisfaction for Queensland. As the one progresses the other must advance in self-protection. Already the experience gained in one place has had its effect in the other. New Guinea tobacco seed has been sown in this colony with every success, and experiments with coffee there bids fair to help us with disease-proof plants here. Mutual assistance will raise both in the natural, and therefore in the best possible, way. For this reason it is worthy of note that the Queensland Branch of the Royal Geographical Society ot Australasia has taken up the study of New Guinea *con amore*. Geography, like charity, should begin at home. Our men of science obtain recognition as they work in the field before them, and so benefit the world at large by confining their attention to the spot most accessible. In this respect Queensland has the Southern colonies at advantage. This new land is our natural possession—not in the political sense but in the scientific. We have first access to results. Our local geographers should be able to make a mark for the Queensland society without going any further afield. And Sir William MacGregor has given the word. For many a long day there will be work for the explorer and geographer. and he asked the society last night to "go forward."

Against the opinion of the *Observer* we have nothing to say. To the Council and members who have attended our monthly meetings it is well known that Sir Henry Norman has for several years closely and consistently identified himself with the work of this Society, and our labour in the field of geographical science owes success in no small measure to the stimulating influence exercised by His Excellency's presence amongst us and to the moral and material support which he has unstintedly afforded. Ever since his arrival in Brisbane, some six years ago, Sir Henry Norman has been a constant attendant at our monthly and general meetings, always taking a lively and active interest in the papers and discussions, while he has enriched our library by valuable donations. The congratulatory address,

which we print in another part of this volume, testifies to the high esteem in which His Excellency is held by our Council and members.

Of the "eminent services" rendered "to the Empire" by Sir William MacGregor, both administrative and geographic, we cannot speak too highly, although it is with the latter we are chiefly concerned. For years he has laboured in British New Guinea, against the fearful odds of numerous tribes of warlike savages and the powerful influence of a trying climate. With a small staff of followers, most of whom were recruited from the ranks of friendly local tribes, he has climbed the loftiest heights of the Possession and carried the British flag to every district along the whole seaboard of the country as well as to the more remote regions of the interior. To every department of geographical science Sir William MacGregor has contributed a mass of valuable material, and this was very gracefully referred to by our esteemed Patron who, acting as the mouthpiece of the Society at the meeting of the 20th August, thanked Sir William for his "eminent services to the Empire," remarking that he had supplied information "upon almost every conceivable subject."

Concerning our interest in the geography of New Guinea, we can only say that we are simply endeavouring to help our neighbour and to supply to co-workers reliable information concerning a new and as yet imperfectly-known country. In this respect we only try to do a duty and to justify our existence. New Guinea lies at our very door; it is as much a part of Queensland as Thursday Island and other islands in Torres Straits; it is, moreover, almost directly subject to the administrative control of the Queensland Government, whose hearty co-operation has enabled the Administrator to carry on the work of exploration and administration with remarkable success during the past six years. Our own interest in British Papua commenced with the proclamation of the Protectorate Government in that country and our publications, extending over a period of nearly ten years, bear ample testimony of our work in disseminating information concerning the geography of the Possession; nor do these fully represent our labours, for kindred societies in Europe and America have been supplied by us direct

with information, published from time to time in the journals of those institutions. In the field of Papuan exploration, too, the Royal Geographical Society of Australasia has taken an active leading part, both in the discovery and examination of the Strickland River by the scientific expedition organised and equipped by the New South Wales Branch of the Society and the mounts Obre and Yule expeditions sent out by the Victorian Branch. These costly expeditions, planned and carried out in the interests of science and commerce, were heartily supported by the Australian public—the first, especially, being aided by substantial money grants from the Governments of New South Wales, Victoria, and Queensland ; while it was largely owing to the patriotic and public-spirited action of the last that the expedition was enabled to reach the shores of New Guinea. The early efforts of our sister branches to open up the south-eastern part of Papuan territory to British settlement, by investigating and drawing public attention to its immense resources and by urging its annexation to the Crown, are in themselves sufficient to entitle us to claim a place in the honourable march of Empire in British New Guinea.

GEOGRAPHICAL NOTES.

Ethnography of the Aran Islands.—At the last meeting of the British Association attention was directed to the importance of a systematic Ethnographic Survey of the United Kingdom. Professor N. C. Haddon and Dr. C. R. Browne of Dublin have recently prepared for the Royal Irish Academy (*Proceedings*, 3rd series, vol. ii. No. 5) an exhaustive study of the Aran Islands, which is intended as the first of a series of studies in Irish ethnography. These islands, which lie in the mouth of Galway Bay, about 28 miles west of Galway harbour, are three barren masses of limestone rock, thickly strewn with large ice-worn erratic boulders of granite and sandstone from Connemara. The total population is nearly 3000. The inhabitants of an island do not marry outside it; consequently little fresh blood is introduced, and there is considerable facial resemblance among the natives. They are well made, of good stature, with grey or blue eyes, and usually dark brown hair. The general facia type has been described as an exaggeration of the Gaelic. The authors made a large number of anthropometric measurements, which are given, together with typical photographs. The data thus collected lead them to dissent from the opinion that the Aranites are descendants of the Firbolgs, a small, swarthy, dark-haired people, held to be of Thracian origin. The chief antiquities of the islands are the well-known pre-Christian duns or forts. Cloghans, or beehive stone huts, are common. Primitive customs and beliefs abound. Offerings are regularly made at sacred wells and other holy places. The skin of the seal is used as a preventive against gout and colic. The belief in the evil eye is almost universal. Stone anchors are still in use, and querns have been employed until quite recently. An excellent bibliography completes a valuable paper. —*The Geographical Journal, July, 1894.*

The Pamirs.—The Russian *Official Messenger* publishes a letter from Sven Hedin, who has made, during his journey from New Marghilan to the Russian military post, Pamirski, very interesting scientific observations. He reached the post on March 18, after a very difficult journey, the most difficult part of it having been the passage through the Tenghiz-bai gorge. The northern slope of the pass was all covered with snow avalanches, which were forming large snow cones, round each of which a special foot-path had to be made for the passage of the beasts of burden. Once, when this precaution had been neglected, a horse slid on the icy surface of a snow corniche, and fell down a precipice, 120 feet deep, into the river Isfairam, and of course was killed on the spot. Still the passage through the valley of the Isfairam was delightful, on account of the beauty of the views,

which opened at every step of advance. From Austan to Langar the ascent is very steep, and the mass of snow increased, so that after a twelve hours' ascent the party was half broken down on reaching the Kirghiz yurts at Langar. On the southern side of the Tenghiz-bai Pass the snow was also very deep. On the day before, an enormous avalanche, over 400 yards long and over 20 yards deep, had fallen, and when the party reached Daraut-kurgan a snowstorm began. Snow was also very deep in the whole of the Alai valley. It appeared from a measurement that the Kizil-su at Daraut-kurgan carries 26·3 cubic yards of water per second (2,272,500 per day); but during the summer the same river carries four to five times more water than during the winter. At Bardob the traveller dug through the snow, and found it 1 yard (91 centimetres) deep: it consisted of six different layers, indicating six different periods of snowfall. The temperature of the air being 11·3 deg. Fahr., the temperature of the snow at a depth of an inch was—8·5 deg. Fahr., and it increased by 1·8 deg. Fahr. for each 15¾ inches (one-tenth of a centigrade degree for each four centimetres). It may thus be taken that, on the Pamirs and the Alai, the soil freezes to a depth of 3·3 feet, where it is protected by the snow from the burning rays of the sun. Snow remained deep as far as Kizil-art, but on the southern side of this gorge it became scarce, and large spaces remained quite free. Taking advantage of the ice which covered Lake Kara-Kul, M. Hedin made measurements of its depth. As might have been expected from the surrounding mountains, which appear in high and huge masses on the western shore, while the eastern shore lies in flat valleys, the depth of the lake in its eastern part is small; but it is more considerable than might have been expected from a lake lying on a plateau, in its western part: there it attained 825 feet. The temperature on the surface was that of the freezing-point, but it increased where the depth was greatest. The thickness of the ice was such, the author remarks, that St. Petersburg might have been built on the western side of the lake, and Moscow on the eastern side. On Muz-Kol M. Hedin saw a very interesting formation of ice, deposited by two wells, which had assumed the form of two small volcanoes, 16 and 26 feet high, and about 660 feet in circumference, with a funnel in the middle, from which water was continuing to flow. The Ak-baital Pass was very difficult, and the party there lost a second horse. Altogether, the winter journey on the Pamirs is full of hardships, and it could not have been performed were it not for the extreme kindness of the Kirghiz and the Russian authorities. Favourable circumstances must also be taken into account. There was only one snowstorm, and the temperature was not unbearable. The observed minimum was—36·5 deg. Fahr. on Kok-sai, and at Urtak it was—30 deg. in the open air, and —12 deg. in the tent. At Kara-Kul the party was met by a "jighit," despatched from the Pamirski post; and on March 18 they saw the most wonderful sight of a Russian post, with its earthen fortifications and quick-firing guns, amidst the wild plateau of the "Roof of the World." The fort, the traveller remarks, is very well built, and the difficulties which must have been overcome testify to the enterprise and energy of the builders.—*Ibid.*

Plants from Tibet.—Mr. Hemsley has lately reported on the plants collected by Dr. Thorold during Captain Bower's recent expedition to Tibet, of which an account has appeared in the *Journal.* Not a tree nor a shrub was seen by the party during the five months they spent at an altitude of over 15,000 feet. 115 species of plants were brought home, one-quarter of them being peculiar to Tibet. The highest elevation at which a flowering plant (*Saussurea tridactyla*) was found was 19,000 feet; but the Schlagin-weits discovered a plant living at a still greater elevation (20,000 feet), at a higher latitude. Red-coloured flowers formed a quarter of the whole, then yellow, white, and blue. Many of the plants were well protected by thick wool. Butterflies were seen as high as 17,000 feet.—*Ibid.*

The Aborigines of Japan.—The Ainus, or aborigines, inhabiting northern districts of Japan, are a curious race. Their customs as regards burial are very singular. The Ainus have no cemeteries. Each person chooses a spot for the body of his relative, and they generally bury far away in the mountains. Formerly it was the chief's duty to seek out a burying place and to attend to the funeral. The people keep their graves as secret as possible, being, like the members of many other barbarous races, much afraid of the ghosts of the dead. They visit the graves only upon exceedingly rare occasions, or under very great pressure. Thus Ainu places of burial are very soon forgotten, and the graves quickly become quite indistinguishable from the forest around them. Whenever the Ainu finds it necessary to speak of death and burial, as of course it sometimes must be, they talk with a hushed voice, and use a figurative and roundabout phraseology. Thus death is called "sleeping," "overcome with deep sleep," "resting," "leaving the world behind," "going," "gone away," "is not." Even a person's name is to be forgotten when death overtakes him. —*Bulletin of the Geographical Society of California, May, 1894.*

Great Britain and the Congo Free State in Central Africa.—On May 12th a convention was signed at Brussels giving to the Congo State the Bahr-el-Ghazal under certain restrictions, and regulating the boundary between that State and the British possessions. From Cape Akalunga on Lake Tanganika, at about 8 deg. 15min. S. lat., the line will run to the point where the Luapula flows out of Lake Moero, and will pass on to the mouth of the Luapula at the southern end of the lake, leaving the island of Kilwa to Great Britain. It will then follow the river to Lake Bangweolo, and thence run due south to the crest of the watershed of the Congo and Zambesi, which will form the boundary as far as the Portuguese frontier.

To the north of the German sphere of influence in East Africa the frontier is to follow the 30th meridian of E. longitude up to the watershed of the Congo and the Nile, which is the limit fixed to the north and north-west. The Bahr-el-Ghazal, however, and the western part of the Equatorial Province are to be granted on lease to the Congo State. This territory will be limited by a line starting from a point on Lake Albert immediately to the south of Mahagi, and running to the nearest point of

the watershed before-mentioned. It will then follow the watershed up to the meridian of 25deg. E. long., and this meridian to the parallel of 10deg. N. lat. This parallel will mark the northern boundary as far as the Nile, somewhere to the north of Fashoda. The eastern boundary follows the Nile and the western shore of Lake Albert. This lease is to remain in force during the reign of King Leopold II., but at his death the territory will be limited on the east by the 30th parallel ; the Congo State, however, retaining a belt 15½ miles broad (25 kilomètres) to be determined by agreement, stretching from the watershed to the lake, and including Mahagi. With this modification the lease is to continue in force as long as the Congo basin remains an independent State or a Belgian colony under the sovereignty of the King and his successors.

On the same terms as the territory to the west of the 30th meridian is granted to the Congo State, Great Britain obtains a lease of a belt of country 15½ miles broad, extending from the most northern port on Lake Tanganika to the most southern point of Lake Albert Edward. In the territories granted on lease, the subjects of each of the contracting Powers shall enjoy all the rights granted to the subjects of the other Power.

The Congo State authorises the construction, by the British Government, or a company duly empowered to carry out the work, of a telegraph line connecting the British possessions in South Africa with its territory on the Nile, the Congo State having the right to connect this line with its own system.—*The Scottish Geographical Magazine, July, 1894.*

Types of Craters in Mexico and Guatemala.—Dr. Carl Sapper summarizes the observations he made on craters during his travels in Mexico and Guatemala in 1892 and 1893, in the April number of *Petermanns Mitteilungen*. The rapidity with which a newly formed crater is transformed, and the shape it ultimately takes, depend on the nature of the materials of which it is composed, and on the strength of the various weathering agents, wind, rain, frost, chemical decomposition, etc. When the cone is originally made up of ashes, it is very soon modified by the falling away of the loose material, so that the mouth of the crater is widened, and a rapid flattening and lowering of the summit takes place, the winds and eroding agencies having full play. Such craters are, Monterico, or in the limiting case Tacana, where nothing is left but the rocky foundation of the mountain. Lapilli craters have much the same history, but spread over a longer period ; for instance, the south great Atillan volcano. In mixed craters the walls are partly of stone and partly of looser material. These are very common. The rocky part still shows the original outlines of the crater with steep walls, the looser part is modified as in the case of the ash craters, but less rapidly, as the stone walls form a protection. This is well seen in the principal crater of Tajumulco, and was probably the condition in most craters now partially destroyed. The most stable form is the true rocky crater, whose walls change very little. In the upper part is a ring of débris of loose eruptive material, while another rubbish band is

formed round the bottom of the crater wall, making the originally tubular crater kettle-shaped. Popocatapetl is an example, but not a perfect one, as some lapilli banks occur in it.—*The Geographical Journal, July, 1894.*

A Buried City in Colorado.—The ruins of a prehistoric city were discovered a short time since by a party of prospectors from Yuma, when on the Colorado Desert, U.S.A., in search of the Pegleg Mine. The wind had laid bare the walls and remains of stone buildings for a distance of 420 feet in length by 260 feet in width. Gigantic pillars, quaintly carved to represent dragons' heads and rattlesnakes, still stood in the sand of the desert, supporting on their tops huge slabs of granite weighing many tons. Frieze ornamentation resembled Egyptian sculpture, and exhibited a greater degree of skill than is possessed by the Indian artisans of the present day.—*Bulletin of the Geographical Society of California, May, 1894.*

The Railways of New Zealand.—The construction of railways in this colony was commenced in 1861 with a line, 8 miles long, from Lyttleton on the east coast of Middle Island to Christchurch. Owing to the difficulty of making a tunnel 1¾ miles in length through the intervening mountain range, the work was not completed until the end of 1867. In 1870 the lines opened for traffic were only 45 miles in length, while in 1893 the total length had reached 1897 miles, the cost of construction being on the average £7812 per mile. The gauge is 3ft. 6in. Besides these State railways there are lines of the aggregate length of 150 miles belonging to private companies, of which the most important is that running from Wellington to the Manawatu river on the west coast of North Island, a distance of 84 miles.—*The Scottish Geographical Magazine, July, 1894.*

Neu-Mecklenburg.—This island, formerly called New Ireland, stretches from north-west to south-east, and has a bend in its southern part which gives it the form of the butt of a revolver. It is narrow, and gives the impression of being a lofty mountain chain which has subsided beneath the waters, leaving only its highest peaks still visible. In consequence of this configuration the coast is but little indented: the whole south-west coast, extending for a length of nearly 250 miles has scarcely any opening deserving the name of a harbour. At the southern extremity there are some roadsteads, and at the northern end the numerous small islets and coral reefs form sheltered anchorages. Geologically the island falls into three divisions. No one has yet ventured into the ravines of the northern portion, but its formation may be learnt from an inspection of the islets which in former times were probably connected with the main island. They consist of clastic rocks resembling granite in colour. The extreme north-western end of the island is a long plain of laterite sloping to the sea. The middle part, in which a sudden dip occurs, appears to be composed of alternate strata of limestone and sandstone, lying on volcanic rocks of various kinds. The brooks have in some places cut deep into this formation, and carry down fragments of porphyry, basalt, diabase, and granite; nor

is anhydrite wanting. The southern part of the island seems to entirely of volcanic origin; at this end the land spreads out, and the mountains attain a greater elevation, several summits being, perhaps, 6500 feet high. The surface is covered with forest, except in a few small patches, where ferns and grasses, chiefly *alang-alang*, take its place. Except in the southern part, however, the trunks are not large enough to yield useful timber.

Neu-Mecklenburg seems to be inhabited by three different types of men. It may be shown that not so very long ago an immigration took place from the Gazelle peninsula. The intruders settled in the middle part of the island, cutting off communication between the original inhabitants at the northern and southern extremities, who in course of time developed into distinct types. The physical difference of the people of Neu-Pommern (New Britain) and the aborigines of Neu-Mecklenburg is striking, and especially, according to Count Pfeil (*Petermanns Mitt.* Bd. xlvili. No. 4), in the smell, the native of Neu-Pommern being a very unpleasant neighbour except when he has been chewing betel. The aborigines at the extremities of the island have more elegant figures than the later settlers, broader foreheads, better-shaped noses, and thinner lips. They are more intelligent and less opposed to innovations, and will give the stranger food, though they are quite ready to eat him up when they get an opportunity. The people of Neu-Mecklenburg also distinguish themselves by greater cleanliness in their houses and persons, and are braver, not fearing occasionally to attack their enemy openly. They make spears with points of hard wood, and axes of shell, porphyry, and greenstone; but now the latter have almost entirely given place to cheap axes of English make, to which the natives fix wooden handles 3 or 4 feet long. Drums are made, some of them very large, and a code of signals is used. The wood-carving is remarkable for the drawing and originality. One specimen seen by Count Pfeil deserved notice both on account of its fine work and because it represented a bird of paradise and a monkey, creatures not found on the island. Shell ornaments are much in vogue. A very elegant one is made of a piece of *Tridacna* shell varying in size from that of a half-crown to a saucer, on which is laid a piece of tortoise-shell of the same size with a pattern cut through it.

The only domestic animals are thin, long-legged black pigs. *Taro* and yams are cultivated, the work being done by the women, and also another root, which Count Pfeil found only on the mountains of the middle part of the island: it is like a new potato, with a sweetish taste; but as the plant was not in flower, Count Pfeil could not determine its family. Sago, fish, banana, and human flesh are also used as food, the last being eagerly sought for. In some districts they burn the dead, and in others throw them into the sea. The men of Neu-Mecklenburg are enterprising traders, and extend their operations to distant islands. In the south and east very good canoes are made of planks fastened together with *Pandanus* fibres, and caulked with a resinous substance. Shell-money of different kinds and values serves to facilitate exchange.

Count Pfeil succeeded in crossing the island twice at the narrow part to the north-east of Neu-Lauenburg, attaining a height of 5900 feet. He found no cockatoos or parrots on the island. Wallabies and cassowaries, which live on the Gazelle peninsula, are not found here, but the whitish-yellow pigeon of the Torres Straits is common. Butterflies are not numerous; beetles are better represented. Of large game there is none.—*Ibid.*

The Victorian Branch.—The eleventh volume of the Transactions of the Victorian branch of the Royal Geographical Society of Australasia, a copy of which we have just received, is a valuable addition to the literature of its class. The first paper, upon the "Queensland blacks together with those of the Northern Territory," is by Mr. B. H. Purcell, well known to many of our readers. The paper was read on 3rd of February. Mr. Purcell appears to have taken at short notice the place of Mr. Meston. It will be remembered that those two gentlemen were associated in a scheme for taking to the World's Fair at Chicago a band of aboriginal Australians, belonging to northern tribes; the scheme was, however, by various causes, wrecked. Interesting information is given by Mr. Purcell in his paper, concerning several of the tribes. The extraordinary custom or rite called "bora," as practised among the Kargoolnahs of the Paroo tribes, is spoken of, but not described, and his own compulsory submission to the rite. He also touches upon the marriage customs, the cannibalism, the legends of the tribes of which he speaks. The paper is short but interesting. It may be added that the minutes state that on the 15th February, Mr. Purcell described, in the presence of about 70 gentlemen, the aboriginal ceremony known as "Mickas," or "Sturt's terrible rite." Three male and two female aborigines of the Wakü tribe were present to illustrate the description. The Purcell paper is followed by "Notes on the antiquity of the Australian aboriginal race, founded upon the collection in the Warrnambool Museum," by J. Archibald. The argument for the antiquity is based upon the two forms of stone axe—"the diorite axe and the grooved or basalt axe,—which are found in and upon the earth overlying the limestone deposit which caps the post-tertiary sand rock on and of which the town of Warrnambool is built." Reference is made to "one of the most interesting slabs in the world found there in 1890, which retains the impression left by two human beings, who had once sat side by side at the foot of the then existing face of the ancient sand dune, more than 50ft. below the present surface." Next comes an interesting and learned paper on "The Fantastic Islands of the Indian Ocean and of Australasia in the Middle Ages, and their significance in connection with the early cartography of Australia," by George Collingridge, Hon. Secretary of the Sydney Branch of the Royal Geographical Society of Australasia. As Mr. Collingridge in this paper refers to Cipango and Java, it will be right in such a publication as this to state that that gentleman recently contributed to *The Geographical Journal*, the official organ of the Royal Geographical Society, London, an article on the "Early Cartography of Japan," in which he asserted that Marco Polo, when speaking of Cipango, meant Java and not Japan. This was followed

by a paper contributed to the journal of the Royal Dutch Geographical Society by the learned Map Curator of that institution, who ridiculed Mr. Collingridge's paper as a " step backward " (*vide* " Tijdschrift van het Kon. Nederlandsch Aardrijkskundig Genootschap." Tweede Serie, Deel XI., No. 3). Mr. David Lindsay, F.R.G.S., of the Elder Expedition of 1891-2, contributes, "Brief Notes on the aborigines met with by that Expedition." Mr. Lindsay's " notes " are followed by what will probably be counted by most readers, as the best paper in the volume. Mr. J. W. Lindt's paper on " The Fire Ordeal at Beqa (Mbengga), Fiji Islands." The astonishing rite was witnessed by Mr. Lindt, in company with Sir J. B. Thurston, Governor of Fiji, and Lady Thurston, in September, 1892. (?) The minutes of the meeting at which the paper was read, say, " Mr. Lindt described at some length the ancient rite, which bore a strong family likeness to the rite of ordeal by fire common in mediæval Europe— ' A party of warriors . . . boldly marched into a pit paved with red-hot stones, . . . and came out unscathed. The impression formed by the observers was that the skin on the soles of the warriors' feet was unusually thick.' " The paper is illustrated by half-a-dozen most excellent copies of photographs taken by Mr. Lindt. Plate No. 1, " Jonacani Dabea, Chief of Beqa," and No. 2, " Magiti, or the presentation of food," being especially excellent. Hovell and Hume's " Journal of Discovery to Port Phillip, New South Wales, in 1824 and 1825," is published as a sort of quasi supplement to the Transactions. The Journal itself is in the Melbourne Public Library, and the Trustees kindly allowed Mr. Skene to take a copy of it. A series of nine drawings by Master Carl Archibald, illustrate the leading incidents of the expedition. As a record of one of the earliest of the many explorations in Australia, this Journal is worthy of this extended publication. The Transactions also contain a fine likeness and an appreciative biographical notice of M. Edmond M. La Meslée, who was practically the founder of the New South Wales branch of the Royal Geographical Society of Australasia, and its first honorary secretary. He, " with Madame La Meslée and five others, met an untimely death through the foundering of a pleasure yacht in Sydney Harbour, on 17th December, 1893."

SIXTH

INTERNATIONAL GEOGRAPHICAL CONGRESS.

LONDON, 1895.

PATRON: HER MAJESTY THE QUEEN.

VICE-PATRON: H.R.H. THE PRINCE OF WALES, K.G., K.T., K.P., G.C.B., ETC., ETC.

The following Circular is published for general information:—

IT has now been definitely arranged that the Sixth International Geographical Congress will be held in London early in August, 1895, the precise date to be announced later.

The Organising Committee cordially invite all who take an interest in any of the various aspects of Geography to attend the Congress, and to assist in making it a scientific success.

As the Congress is INTERNATIONAL it is proper that the subjects submitted for consideration should be of wide importance and of permanent interest. The Organising Committee, assisted by specialists, are now arranging a programme of subjects suited for discussion, and are in communication with geographers of several nationalities. The attendance at the meetings of those most able to discuss the subjects which may be introduced is invited, and may confidently be expected.

Communications intended for the Congress may be made in French, German, Italian, or English.

At present it is only considered necessary to announce the general heads under which the various subjects to be dealt with at the Congress will be grouped. They are as follows:—

I. Mathematical Geography, including Geodesy.
II. Physical Geography, including Oceanography, Climatology, and Geographical Distribution.
III. Cartography and Topography.
IV. Exploration.
V. Descriptive Geography. Orthography of Place-names.
VI. The History of Geography.

VII. Applied Geography—with special reference to History, Commerce, Colonisation, &c.

VIII. Education.

At a later period it will be decided to what extent, if at all, the Congress will be divided into groups or sections for the purposes of holding meetings. But in any case business will be so arranged that as far as possible all the subjects for discussion and consideration will be brought before all the Members of the Congress. When necessary, Committees will be appointed to deal with special subjects.

The Organising Committee reserves to itself the privilege of determining the order and nature of the proceedings on each day.

Geographical problems connected with Colonisation will probably be dealt with in some detail at the Congress, and therefore those interested in or connected with the Colonies of all European countries, are specially invited to attend.

The subscription payable by Members is £1, or 25 francs. On payment of 10s. or 12·50 francs, the wives and daughters of Members can obtain all the privileges of membership, except the right to receive copies of any publications which may be distributed to Members.

A circular giving full details as to arrangements, subdivision of subjects, Exhibition, &c., will be issued next year.

It is requested that the contents of the present circular may be made as widely known as possible.

All communications should be addressed to The Secretary, International Geographical Congress, 1 Savile Row, London, W.

J. SCOTT KELTIE, HUGH ROBERT MILL, *Secretaries.*

LEONARD DARWIN, *Chairman of Committee.*

1 Savile Row, London, W.,
November, 1893.

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ABSTRACT of Proceedings of the Linnean Society of New South Wales—Aug., 1893, to July, 1894. *From the Society.*

ANNUAL Report of the Department of Mines and Agriculture, New South Wales, for the year 1893; Records of the Geological Survey of N.S.W. Vol. IV., Part 1. *From the Hon. the Minister for Mines.*

ANNUAL Report of the Bureau of Ethnology, 1886-87; Contributions to North American Ethnology. Vol. VII.; Bibliography of the Chinookan Languages. *From the Department of the Interior, U.S.A.*

ANNUARIO del Observatorio Astronómico Nacional de Tacubaya. Para el Ano de 1894. *From the Observatory.*

ANNALEN des K. K. Naturhistorischen Hofmuseums. Band VII., Nos. 1-4. Wien, 1893. *From the Museum*

ANNUAIRE Géologique Universel. Tome IX., Nos. 1-3. 1893-94. Paris. *From the Publishers.*

ARCHIVES Néerlandaises des Sciences Exactes et Naturelles. publiées par la Société Hollandaise des Sciences a Harlem. Tome XXVII., Nos. 1-5; Tome XXVIII., No. 1. *From the Society.*

AUSTRALASIAN Association for the Advancement ot Science. Hobart, 1892. Vol. IV. *From the Association.*

AUSTRALASIAN Association for the Advancement of Science, Section E.: Address by the President, A. C. Macdonald, F.R.G.S. *From the Author.*

BOLETIM da Sociedade de Geographia de Lisboa. 11A Serie, Nos. 11 and 12; 12A Serie, Nos. 1-12; 13A Serie, Nos. 1 and 2. *From the Society.*

BOLETIN de la Sociedad Geogràfica de Lima. Ano. II., Tomo 2, 1893; Ano III, Tomo 3, 1893, Nos. 1-3. *From the Society.*

BOLETIN de la Sociedad Geográfica de Madrid. Tomo XXXV., Nos. 1-6; Tomo XXXVI., Nos. 1-4. *From the Society.*

BOLETIN del Observatorio Astronómico Nacional de Tacubaya. Tomo I., Nos. 14-16. *From the Observatory.*

Boletin de Agricultura, Mineria e Industries. Ano III., Nos. 2, 3, 13, 1893; Boletin Semestral de la Direccion General de Estadistica de la Republica Mexicana. 1889-90, Nos. 4-6; 1891, Nos. 7 and 8; 1892, Nos. 9 and 10; El Clima de la Ciudad de Mexico, 1893; Estadistica General de la Republica Mexicana. Ano VII., No. 7.

From the Observatoire Meteorologique Central de Mexico.

Boletin de la Sociedad de Geogratia y Estadistica de la Republica Mexicana: Cuarta Epoca. Tomo II., Nos. 1-10, 1890-93. *From the Society.*

Boletin del Instituto Geográfica Argentino. Tomo XIV., Nos. 5-12, 1893. *From the Institute.*

Bollettino della Societa D'Esplorazione Commerciale in Africa. Milano. Anno IX. Fasc. V. *From the Society.*

Bulletin de la Union Geographique du Nord de la France. Tome XIII., Nos. 1-4, 1892; Tome XIV., Nos. 1 and 2, 1893. *From the Union.*

Bulletin de L'Académie des Sciences de St. Petersbourg. Nouvelle Serie III. (XXXV.), Nos. 1-3. *From the Academy.*

Bulletin of the Essex Institute. Vol. 23, Nos. 1-12; Vol. 24, Nos. 1-12; Vol. 25, Nos. 1-3. *From the Institute.*

Bulletin de la Société des Etudes Coloniales et Maritimes. 18e Annie, No. 131. *From the Society.*

Bulletin de la Société de Géographie Commerciale de Paris. Tome XV., Nos. 3 and 4, 1893. *From the Society.*

Bulletin de la Société de Géographie du Havre. May to Dec., 1893. January to April, 1894. *From the Society.*

Bulletin de la Société Royal Belge de Géographie. 1893, Nos. 3-6. *From the Society.*

Bulletin de la Société Royal de Géographie d'Anvers. Tome XVII., No. 5; Tome XVIII., Nos. 1-4. *From the Society.*

Bulletin de la Société de Géographie Commerciale de Bordeaux. Nos. 13-24, 1893; Nos. 1-9, 1894. *From the Society.*

Bulletin de la Société de Géographie de Paris. Tome XIII., No. 4, 1892. Septéme Serie; Tome XIV., Nos. 1-4, 1893. *From the Society.*

Bulletin de la Société de Géographie de Marseille. Tome XVII., No. 4, 1893; Tome XVIII., Nos. 1 and 2, 1894. *From the Society.*

Bulletin of the American Geographical Society. Vol. XXV., Nos. 2-4, 1893; Vol. XXVI., No. 1, 1894. *From the Society.*

Bulletin de la Société Imperiale Russe de Géographie. Tome XXIX., Nos. 3-6, 1893; Tome XXX., No. 1, 1894. *From the Society.*

Bulletins of the Department of Agriculture, Nos. 1 and 25, 1893; No. 2, 1894. *From the Under Secretary for Agriculture, Brisbane.*

Bullettino della Sezione Fiorentina della Societa Africana D'Italia. Vol. IX., 1894. *From the Society.*

"Cosmos." Vol. XI., Nos. 1-9, 1892-93. *From Professor Guido Cora.*

Climatological Table, July, 1893. Tables of Rainfall and Meteorological Synopsis for 1893. *From the Chief Weather Office, Brisbane.*

"Coal and Iron." Vol. II., Nos. 42, 46, 49, 51, 54, 55, 58, 60-62. The Phar-

maceutical Journal of Australasia. Vol. VI., Nos. 2, 3, 5, 6, 9, 10; Vol. VII., Nos. 3 and 5. *From H. L. Thompson, F.L.S*

Dioptrique.—Lois Vraies de la refraction Simple. Par Jesus Gasca. *From the Author.*

Department of Mines, Sydney, N.S.W.—Memoirs of the Geological Survey of N.S.W.; Geology; Records of the Geological Survey of N.S.W. Vol. III., Parts 1-4, 1891-3; and Geological Map of N.S.W., 1893. *From the Hon. the Minister for Mines.*

Deutsche Geographische Blatter. Herausgegeben von der Geographischen Gesellschaft in Bremen, durch Dr. M. Lindeman. Hefte 1-2, Band XVII. *From the Society.*

Documents in Reference to the General Adoption of the Twenty-four Hour Notation on the Railways of America. Nos. 1 and 2. *From Sandford Fleming, Esq., C.M.G.*

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Geographische Nachrichten. Organ der Ostschweizerischen Geographisch Commerciellen Gesellschaft. Nos. 17-24, 1893; Nos. 1-8. Basel: 1894. *From the Society.*

Goldthwaite's Geographical Magazine. Vol. V., Nos. 10-12. *From the Publishers.*

Hazell's Annual, 1894. *Purchased.*

Illustrated Official Handbook. Exhibition Building, Melbourne, 1894. *From the Trustees.*

Jahresbericht der Geographischen Gesellschaft zu Greifswald, 1883-1893. *From the Society.*

Jahresbericht des Vereins für Erdkunde zu Metz, 1892-93. *From the Society.*

Jahresbericht des Frankfurter Vereins für Geographie und Statistik, 1890-91 and 1891-92. *From the Society.*

Jahresbericht der Geographischen Gesellschaft von Bern, 1891-92. *From the Society.*

Jahresbericht (XI u XII, 1892 u 1893) des Würtembergischen Vereins fur Handelsgeographie. *From the Society.*

Journal of the Royal Colonial Institute. Vol. XXIV., Nos. 1-8; Vol. XXV., Nos. 1-7. *From the Institute.*

Journal of the Tokio Geographical Society for 25th year Meiji (1892). *From the Society.*

Journal of the Tyneside Geographical Society. Vol. II., Nos. 4 and 5. *From the Society.*

Journal and Proceedings of the Royal Society of New South Wales. Vol. XXVII., 1893. *From the Society.*

La Géographie; VIIe. Année, Nos. 283-285. *From the Publishers.*

Le Globe, Journal Géographique; Organe de la Société Géographie de Genéve. Tome XXXII.; Nos. 4 and 5. *From the Society.*

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MEMOIRS and Proceedings of the Manchester Literary and Philosophical Society. Vol. VII., Nos. 2 and 3; Vol. VIII., Nos. 1 and 2. Fourth Series. *From the Society.*

MEMORIAS y Revista de la Sociedad Cientifica "Antonio Alzate," Mexico. Tomo VI., Nos. 11 and 12; Tomo VII., Nos. 1-10. *From the Society.*

MINNESOTA Historical Society: Historical Collections. Vol. VII.: The Mississippi River and its Source. By Hon. J. V. Brower. *From the Society.*

MITTEILUNGEN der Geographischen Gesellschaft (Fur Thüringen) zu Jena. Zwölfter Band, 1893. *From the Society.*

NATUURKUNDIG Tijdschrift voor Nederlandsch—Indië. Uitgegeven door de Koninklijke Natuurkundige. Vereeniging in Nederlandsch-Indie. Deel LII. and LIII. *From the Society.*

NEW GUINEA.—Motu Grammar and Vocabulary. By Rev. W. G. Lawes. *From Capt. J. L. Michael.*

PROCEEDINGS of the Californian Academy of Sciences. Vol. III., Part 2, Second Series. *From the Academy.*

PROCEEDINGS of the American Academy of Arts and Sciences. New Series. Vol. XIX. Whole Series. Vol. XXVII. *From the Academy.*

PROCEEDINGS of the American Philosophical Society. Vol. XXXI., Nos. 140 and 141. *From the Society.*

PROCEEDINGS of the Colorado Scientific Society. Papers read during 1893-94. *From the Society.*

PROCEEDINGS of the Philosophical Society of Glasgow. Vol. XXIV. *From the Society.*

PROCEEDINGS of the Royal Society of Edinburgh. Vol. XIX., 1891-2. *From the Society.*

PROCEEDINGS of the Royal Society of Victoria. Vol. VI., New Series, 1894. *From the Society.*

PROCEEDINGS and Transactions of the Nova Scotian Institute of Science. Second Series. Vol. I., Part 2. *From the Institute.*

PROCEEDINGS and Transactions of the Natural History Society of Glasgow. Vol. III. (New Series), Part 3. *From the Society.*

PROJET de Mesure d'un Arc du Meridien de 4deg. 20min. au Spitzberg. Par P. G. Rosen. Avec une Carte. Memoire public par L'Académie Royale des Sciences de Suede; Oversigt af K. Svenska Vetenskaps Akademiens Förhandlingar. Nos. 48-50, 1891-93; Bihang Till. K. Vet.—Akad. Handl. 16-18; II. Carl von Linnes Brefvexling. *From the Academy.*

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Report on Mt. Morgan Gold Deposits. By R. L. Jack: Geological Maps of the Charters Towers Goldfield: also, 72 Reports, etc., of the Geological Survey of Queensland. *From R. L. Jack, Esq., Govt. Geologist.*

Results of Rain, River, and Evaporation Observations made in New South Wales during 1892. Diagram of Isothermal Lines of New South Wales: Pictorial Rain Maps: Hail Storms: On Meteorite No. 2 from Gilgoin Station: Moving Anticyclones in the Southern Hemisphere; Sydney Obsevatory, Astronomical Results, 1879-81. By H. C. Russell, C.M.G., etc., Government Astronomer of New South Wales.
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Travels Amongst the Great Andes of the Equator. By E. Whymper; Out of Doors in Tsarland. By F. J. Whishaw; A Governor's Cruise in the West Indies in 1884. By General Sir H. W. Norman; Cruise of the Alert. By Dr. Coppinger. *From His Excellency General Sir H. W. Norman.*

Tracing, showing the route of the Victorian Exploration Expedition from Bilbarka to the depôt of Cooper's Creek, and the Exploration from thence towards the North. By W. J. Wills; Map of Burke and Wills' Route from Cooper's Creek to Carpentaria; Der Australische Uberland-Telegraph, Mit Karte; J. M. Gilmore's Reisen in Central-Australien zur Aufsuchung von Spuren Leichhardt's, 1871; The Colony of Victoria, from a model executed at the Surveyor-General's office; The Arctic Shores of America, from Baffin Bay to Cape Bathurst, showing the coast rivers, etc., explored by the officers of the several British expeditions between 1815 and 1859; Report on country in the neighbourhood of Lake Eyre, South Australia. By H. Y. L. Brown, 1892. *From the Hon. A. C. Gregory, C.M.G., M.L.C., etc.*

United States Geological Survey: Eleventh Annual Report, 1889-90; Part 1, Geology; Part 2, Irrigation; Monographs, XVII, XVIII., XX.; Mineral Resources of the U.S., 1891; Bulletins, Nos. 82-86, 90-96; Atlas to accompany the Monograph on the Geology of the Eureka District, Nevada. By A. Hague, 1883. *From the Dept. of the Interior.*

Verhandlungen der Gesellschaft fur Erdkunde zu Berlin. Band XX., Nos. 6-10, 1893; Band XXI., Nos. 1-5, 1894. *From the Society.*

Whitaker's Almanack, 1894. *Purchased.*

Life, Voyages, and Discoveries of Matthew Flinders.—This is the title of a finely illustrated and handsomely bound quarto volume, by Mr. John J. Shillinglaw, F.R.G.S., to be published shortly under the auspices of the Royal Geographical Society of Australasia. The first edition is to be limited to 1,000 copies at 27/6 each, but 500 copies out of the 1,000 will in the first instance be offered to members of the Royal Geographical Society of Australasia who subscribe to its publication, at 20/- per copy. The author, who has spent long years of research upon the subject, and has accumulated a large amount of fresh information, is said to be well qualified to produce a work that will, no doubt, be of national importance to Australasia.

Australasian Association.—The next meeting of the Australasian Association for the Advancement of Science will be held in Brisbane in January, 1895. The following are the officers of the Geographical Section:—President: Baron Sir Ferd. von Mueller, K.C.M.G., F.R.S., etc., President of the Victorian Branch of the Royal Geographical Society of Australasia; Vice-Presidents: J. N. Waugh, M.D., and D. S. Thistlethwayte, C.E.; Secretary: Major A. J. Boyd. About seventeen papers have already been promised for the Section, including one from His Excellency Sir H. W. Norman, on "A West India Island." The Section promises to be a great success.

PROCEEDINGS AND TRANSACTIONS

OF THE

Queensland Branch

OF THE

ROYAL GEOGRAPHICAL SOCIETY

OF

AUSTRALASIA.

10th SESSION,

1894-95.

EDITED UNDER THE AUTHORITY OF THE COUNCIL OF THE SOCIETY

BY

J. P. THOMSON, F.R.S.G.S., ETC., ETC.,

President; Corresponding Member of the New York Academy of Sciences, etc., etc.

The Authors of Papers are alone responsible for the opinions expressed therein.

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The Royal Geographical Society of Australasia.

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VOL. X.

SUGGESTION.

Every person desirous of bequeathing to the Society any money is requested to make use of the following

FORM OF BEQUEST.

I give and bequeath to the Honorary Treasurer, for the time being, of the QUEENSLAND BRANCH OF THE ROYAL GEOGRAPHICAL SOCIETY OF AUSTRALASIA, *the sum of* ....

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NOTE.—*The Geographical Journal* is published monthly by the Royal Geographical Society of London ; price, 1s. 6d. per copy to Members of the Queensland Branch of the Royal Geographical Society of Australasia. The prices of Supplementary Papers and other publications of the former Society may be obtained on application.

The Scottish Geographical Magazine is published monthly by the Royal Scottish Geographical Society ; price, 1s. per copy to Members of the Queensland Branch of the Royal Geographical Society of Australasia.

N.B.—All Donations presented to the Queensland Branch of the Society are acknowledged by letter and in the printed "Proceedings and Transactions."

TRANSACTIONS

OF THE

Royal Geographical Society of Australasia,

BRISBANE.

A Survey of Recent Exploration in British New Guinea.

By the President, J. P. Thomson, F.R.S.G.S., etc.;

Corresponding Member of the New York Academy of Sciences, etc.

[Read at a Meeting of the Society, August 20th, 1894.]

In this paper it is proposed to give a brief summary of the work of exploration carried out in British New Guinea during the past two years. This will be a continuation of one written by myself, and read by His Excellency General Sir H. W. Norman, at the Hobart meeting of the Australasian Association for the Advancement of Science, in January, 1892.* Since then the work of exploration in British New Guinea has been carried on uninterruptedly, several tracts of new country have been visited, and our store of knowledge concerning the geography of that interesting territory greatly increased. This, it is almost needless to say, results from Sir William MacGregor's detailed examination of the extensive river systems of the Papuan Gulf, and of his more recent exploration of the hitherto unknown parts of the north-east coast. The value of these investigations has, moreover, been greatly increased by the astronomically determined positions of many important points along the seaboard of the Possession; by the discovery of extensive areas of fertile land within the river basins of the Papuan Gulf and several important streams on the north-east coast.

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* Australasian Association for the Advancement of Science, Hobart, 1892, vol. iv p. 113. See also the *Scottish Geographical Magazine*. vol. viii., p. 367.

For nearly half a century it had been known to geographers that several rivers existed in the neighbourhood of the Papuan Gulf. The Aird, especially, was noticed by the officers of H.M.S. "Fly" some forty-seven years ago, and more recently several channels were opened up by Mr. Theodore Bevan, whose movements in British New Guinea were chiefly confined to this part of the country. Although these were nothing more than superficial or itinerary sketches of a mere coastal fringe of the Gulf district, they were, nevertheless, the means of drawing attention to an exceedingly interesting and important part of the Possession. Here we are made acquainted with a tract of country north of the Fly estuary, cut up by an almost bewildering labyrinth of tidal channels that constitute the mouths of several important rivers, which traverse enormous areas of rich agricultural as well as low swampy land. To intending settlers in British New Guinea this easily accessible region offers many inducements not readily met with in other parts of the Possession. Ample facilities for inland communication exist in several of the deep-water channels along the coast, while the recently explored Purari River flows through a region possessed of many attractive features of hilly and mountainous country.

To the student of anthropology there are probably few places in the Possession inhabited by a more interesting class of people than those occupying the Gulf country. Along most of the watercourses native villages are thickly scattered, and these are inhabited by numerous tribes of powerful and warlike natives who on several occasions have opposed the friendly advances of Europeans with formidable hostility. A demonstration of this was witnessed some years ago by Mr. Theodore Bevan, who was forced to beat a hasty retreat down one of the river channels whose banks were lined for two miles with continuous villages, inhabited by several thousands of powerful incorrigible warriors. The houses, too, are truly remarkable for their large dimensions and massive architectural structure; dwellings of from 300ft. to 400ft. in length and over 100ft. high being by no means uncommon.* In connection with the earlier exploration of this part of the country there has unhappily been much bitter con-

* British New Guinea.—From the Protectorate to the Sovereignty. By Theodore Bevan; p. 243.

troversy carried on in newspapers and geographical publications between representatives of the London Missionary Society and Mr. Bevan, concerning priority of claim to the discovery of certain rivers, more especially the Purari. In so far as the British New Guinea Government is concerned, the dispute has been settled in favour of Mr. Chalmers, by whom the Purari River was, apparently, first discovered. It was thought by those in favour of Mr. Bevan's claim that the mouths of this river were described by Mr. Chalmers from native report alone, and that no matter how close an approximation to their true position these were located, the result was but a coincidence, as there was apparently nothing to show that the river channels were traversed by Mr. Chalmers at the time of his first visit to the Papuan Gulf.

Next to the Fly the Purari is the largest river in the Possession. It enters the sea by several large channels, the principal or true mouth being in latitude 7deg. 51min. 22sec. south. From this point its general direction is almost due north. In the inland reaches, above tidal influence, it traverses some rough hilly country, flowing almost parallel to and skirting the base of a mountain range, 1,500 to 2,500ft. above sea level. This river was explored by Sir William MacGregor in January and December, 1893. With some difficulty he ascended it at a time when the waters were greatly augmented by heavy rains, and the negotiation of rapids rendered dangerous by the powerful currents that swept over steep declivities where the stream was narrowed by the encroachment of rugged mountain spurs. The highest point reached was at a place slightly north of latitude 6deg. 54min. 03sec. south, or about a degree of latitude south of the Anglo-German boundary. Here the river is not much diminished in size, the average width being about 250 yards. To the north lies a range of mountains 3,000 to 4,000ft. high, and southerly the country is greatly broken up by low rugged hills. To the westward the main range is visible at a distance of from 15 to 20 miles, with its bold seriated perpendicular peaks. There is very little flat land here between the hills and mountain spurs, although sago palms are more numerous than in some parts of the country lower down the river. The geological formation consists of sandstone associated with

nodules of grey limestone. The sandstone is dark blue or grey, usually fine grained. At the Aure junction, some 80 miles from the sea, the Purari receives its first considerable tributary. The width of this branch is from 80 to 100 yards, with a depth of one to two fathoms. Its navigation was impeded by rapids and boulders, so that only a few miles of it were examined. It appeared to come from a northerly direction, between high and rugged mountain ranges whose spurs seemed to terminate abruptly near the stream. Above the junction of the tributary and main stream the general course of the Purari lies along the main mountain range, the southern spurs of which it skirts very closely. Here the general character of the country, on the south side of the river, is a continuous succession of low sandstone hills, little more than 800ft. high. These are rugged and precipitous, covered by dense forest. There are, however, no large trees. By the encroachment of hills, the river in places is narrowed down to about 100 or 150 yards in width. There was no appearance of any permanent native occupation in this district, and owing to its rugged nature the country did not seem adapted for European settlement. The capacity of the river is greatly diminished by numerous groups of islands that occupy the channel. Several specks of gold were found in the bed of the river, and an important discovery of coal was also made near the island of Abukiru, in the main channel of the Purari River. As it is thought that the presence of coal in this district may greatly influence the future of the country, it has been proposed to arrange for a detailed examination of the locality. A few scattered cedar trees, of an excellent quality, were also met with, but the quantity was apparently too small to be of any great commercial value. In this locality an interesting native village was visited, where the houses were different from any previously met with. Their superficial dimensions were about 35ft. by 20ft., consisting of a ground floor and two upper stories. Only a single small entrance was found on the ground floor, and the walls were built up of large logs placed horizontally on each other. These formed a wall several feet thick, completely arrow-proof. The upper story was about 20ft. from the ground; it was reached by a single ladder with steps 3ft. or 4ft. apart. When Sir William MacGregor and party landed at the village there was not a

single native to be seen, but subsequently it was discovered that about 100 of them were concealed in the bush close by, fully armed to the teeth with bows and arrows, without shields. They, however, acted on the defensive, and, consequently, no hostile engagement was witnessed. Their arrows are about 4½ft. long, with a false point of bone, which if left in the flesh of a victim would probably produce blood-poisoning or lockjaw. The people are bronze-coloured, a few being lighter than the Port Moresby natives, and all lighter than those of the Purari delta. The men are well made, of average size; better built and not so loosely-limbed as the Gulf men. They have long moppy hair, without ringlets or tags of any kind. After a great deal of trouble friendly relations were established, and the expedition parted with them on the best of terms.

When descending the river on the return trip, Sir William and party camped at the large native village of Koriki, on the Purari delta. Here there are many of the great club houses commonly met with in the Gulf country, besides a great number of houses of the ordinary type for women and children. The people of this village were friendly at first, but presumptuously bold and aggressively thievish in the extreme; in this respect they surpassed all other known tribes of the district. The Government party had not been many hours in the village when repeated acts of theft led to open hostility, and as the villagers declined to restore several stolen articles an open fight was arranged and carried out with great skill and deliberation by both sides. This was conducted in great naval style in the Koriki channel of the Purari River. The native warriors occupied a large flotilla of canoes, and the Government party the steam launch "Ruby" and two whaleboats. The native force was further strengthened by a line of warriors along the river banks. The position was critical, and at first the issue very doubtful; but, fortunately, it resulted in favour of the Europeans after 400 rounds had been fired. About 400 or 500 native warriors took part in the fight, and they belonged to the villages of Koriki and Koropenaira.

West of the Purari delta, between the mouths of the Fly and Aird rivers, lie three important streams, the Omati, Turama, and Bamu. These traverse enormous areas of low-lying country, of which nothing was known prior to Sir William

MacGregor's visit there some two years ago or thereabouts. The Omati, situated between the Aird and Turama, is a comparatively small stream, meandering between limestone hills 300ft. to 500ft. in height. It is shown on Mr. Bevan's map as the Merewether River. At its mouth lies an island, the Risk Point of the Admiralty charts. The river apparently offers few facilities for access to the inland districts of this part of the country, being rather narrow with a depth of from a half to two fathoms. The country on its lower reaches is low and swampy, and here in the midst of inhospitable surroundings dwell a large population of powerful warlike savages. On a site near the mouth of the river is one of the largest villages in the Possession. There are about 80 large houses, several of them hundreds of feet in length. In physical appearance the natives of this district very closely resemble the tribes on the Lower Fly River. Powerful bows and long-shafted arrows appeared to be their most effective war implements, and nothing can surpass the skill with which they use them. Large swarms of paroquets were met with at the mouth of the river, and the dark shores were illuminated by myriads of fire-flies that kept night-watch in the tree-tops. While in the neighbourhood of the Omati River Sir William MacGregor found the latitude of Cape Blackwood to be 7deg. 49min. 24sec. south. This position, determined by stellar observations, substantially agrees with that assigned to the place by Captain Blackwood.

Slightly west of the Omati the Turama River flows into the Papuan Gulf. At its mouth there are two islands, Morigio and Neabo, apparently formed by the accumulation of alluvial deposits. Except the Fly River entrance, the estuary of this stream is perhaps broader than that of any other watercourse in British New Guinea. On Mr. Bevan's map this stream is called the "George River," and to one of the islands at its mouth he gives the name "Loch." Beyond its appearance on the map there is nothing, however, to show that any part of this river was examined by Mr. Bevan, otherwise he could not have failed to have noticed the existence of *two* islands. This is merely pointed out in passing to indicate how easy it is to bestow a name upon a prominent geographical feature without either fixing its position or examining it in detail, and then to claim the right to speak of

it with no small degree of authority. Of course the right to name is not disputed when qualified by a fairly accurate delineation of position, but it is somewhat remarkable that those who claim the right without that necessary qualification are loudest in protesting against others who, by honest labours, assign to places their proper positions and supersede prior designations by native appellations, or, in their absence, well chosen and appropriate names of European origin. From its mouth the general upward course of the Turama River lies in a N.W. direction; first through flat country; then, as it narrows down to about a thousand yards, it comes flowing through the bottom of a valley flanked on the N.E. by a range of low limestone hills from 400ft. to 600ft. high. On the lower reaches the channels are rather shallow, and each tide is accompanied by a heavy bore, apparently generated in the northern estuary between Morigio Island and Juke's Point. This agitation of the tidal waters of the river takes the form of an enormous volume of water rising wave-like, some 8ft. or 9ft. high, rushing furiously upwards at the rate of 15 knots an hour, and producing a rather subdued noise like distant thunder.

In so far as density of population is concerned, the Turama River proved no exception to the other known districts along the shores of the Papuan Gulf, nor were the native dwellers less warlike in appearance than their excited and hostile neighbours. The bulk of the population seemed to occupy the lower reaches of the river, where they live in a great number of large villages separated from one another by short distances. Out of these thickly packed centres the armed natives emerged in great numbers when Sir William MacGregor entered the river. The excitement was intense, and the waters of the river were quickly covered with an enormous fleet of canoes that seemed to come from all parts of the shore. In dress the women resemble their sisters of Kiwai Island, and like the tribal dwellers of the Fly estuary the head is small, the nose large, and forehead retreating. From off the forehead they shave the hair. The men encircle their waists with a plaited or bark belt, to which is attached a small apron of cloth made from the bark of the nettle or breadfruit tree; this is about twelve inches long and six broad. The canoes are shaped out of single trees; the bows are

sharp and the ends open, but they have no outriggers The paddles are strong lance-shaped shafts of palmwood, and the paddlers stand erect when using them. Some of the canoes contained twenty powerful paddlers.

From a favourable position above the island of Neabo a very good view of a large stretch of inland country was obtained. Easterly and westerly no prominent features appeared upon the low-lying face of the region to obstruct the scope of vision, and over the whole of this vast area dense mangroves and forest patches everywhere met the eye without the slightest glimpse of a break. At a distance of perhaps 20 miles northerly lies a low, long, hilly and wooded range, probably not exceeding 500ft. in height. With a general trend east and west this elevated and somewhat rugged area stretches far and away inland beyond the reach of the eye. On the lower reaches of the river sago palms are very abundant, but greatly diminished in quantity farther inland. About 80 miles from the sea, the highest point reached, the river is narrowed down to about 60 yards; at this point the tide was running up strong, with a depth of 2ft. to 3ft. of water. From this position a very good view of the Darai Hills was obtained, and it was noticed that their westerly extension, which could not be seen from a position lower down the river, increased in elevation to probably 1,000ft. above sea level. This range appeared to form a hilly plateau of limestone formation, extending over an extensive tract of country some 70 or 80 miles from east to west. The river banks were still low, with only a few patchy areas of cultivable land. Most of the country passed through in the basin of the Turama River is unsuitable for European occupation. The district is low and swampy, and the river will be difficult to enter during what is known as the south-east season, when the unsheltered shores of the Gulf are fully exposed to the heavy sea that sweeps the whole coast line. The lower district of the river is densely populated with a powerful and warlike people, who will require to see a great deal more of the Government before it can be said that their attitude towards Europeans is as friendly as that of the tribes in the more settled districts of the Possession.

Except a small unimportant stream called the Gama, the only other watercourse of considerable magnitude, in the western part of the Gulf country, is the Bamu River, connected with the Fly estuary by a navigable channel. The waters of the Bamu enter the Papuan Gulf by three well defined channels, separated by extensive deltaic areas of low swampy country, covered by dense mangroves and nipa palms. A good deal of public attention was bestowed upon this district some two or three years ago, when it was reported that the Rev. Mr. Savage had been killed by the Dibiri natives. Like many other creations of preternaturally excited imagination there was no truth in the rumour. It is believed that the mouth of the Bamu River was visited about half a century ago by the officers of H.M.S. "Fly" who had a conflict with the natives.* This unhappy occurrence is still remembered by the Binarubi people, with whom Sir William MacGregor was unable to establish friendly relations. The estuaries of the Bamu are deep navigable channels, each from a mile to a mile and a half wide and two to five fathoms deep. On the lower reaches of the river, the villages are remarkably large and fairly numerous. About 24 miles from the sea the Bamu stretches upwards through forest country of very rich soil, apparently well adapted for cultivation and settlement. In this district there was no sign of permanent native occupation. Here the river is about a mile wide, three fathoms deep, and the water quite fresh. Some 43 miles from its mouth, the Bamu receives a large tributary stream on its left bank. It is from 100 to 120 yards wide and five fathoms deep. About 16 or 17 miles above its junction with the Bamu, the banks of this tributary are occupied by an interesting tribe of natives, armed with bows and arrows, and carrying the beheading knife and head-carrier so commonly met with among the people of the Gulf country. They wore elaborate shell ornaments, and appeared to be strong and healthy. At first they were inclined to be hostile, but Sir William MacGregor parted with them on friendly terms. The exploration of the lower part of the Bamu basin, besides throwing a flood of light upon a hitherto unknown part of the country, reveals to us a condition of things not easily understood and rarely met with in any other district of the Possession. Here no

* Voyage of H.M.S. "Fly." By J. B. Jukes; vol. i., pages 270 to 278.

cultivated areas were seen, although the soil is exceedingly rich and abundantly watered. The people appeared to live entirely on sago. Bananas were growing wild amongst the rank forest vegetation, but there were no signs of sugar-cane or sweet potatoes. A fair idea of the richness of the land in this district may be obtained when it is stated that there is nothing to be compared with it in the Fly River basin within 400 miles of the sea. It is high and dry, and in every respect eminently suitable for extensive and systematic cultivation, there being a much larger area of good available agricultural land than Sir William MacGregor had "seen elsewhere in the Possession." This district could no doubt be thrown open to European settlement without in any way infringing existing native rights.

Having dealt somewhat briefly with recent exploration in the western part of the country, I shall devote the remainder of this paper to a short and concise description of some newly-discovered features on the north-east coast of the Possession, examined by Sir William MacGregor during the months of February and March last.

The previously known parts of this coast were fairly well described in a paper I had the honour of contributing to our Society some three years ago, shortly after the Administrator's former visit of inspection to that part of the country.* At that time the failure to discover any useful watercourses giving access to unknown inland districts was very much deplored. It was thought that the precipitous and rugged ranges bordering or encroaching upon the coast-line gave little promise of the existence of navigable rivers, and consequently few inducements to pioneer enterprise. Recent detailed examination of some hitherto unexplored parts of the coast-line has discovered the existence of several navigable streams of considerable importance ; while a traverse of the coastal section between Ipote Point and Dako Creek, in Collingwood Bay, shows that there are numerous sheltered channels among many coral islands along the shore of the bay. These will be available for trading crafts in all kinds of weather.

Passing on from this part of the coast line an examination was made of the mouth of a stream slightly north of the Clyde River,

* Proc. & Trans. R.G.S.A., Brisbane; vol. vi., page 32.

within the German territory. From observations of ten pairs of meridian stars, the latitude of this stream was found to be 7deg. 58min. 30sec. S., taken at the place where it enters the sea. It is a comparatively small watercourse called the Ikore River, 40 or 50 yards wide in the lower reaches. The natives here are of a dark bronze colour and quite naked. The hair is worn in ringlets and removed from the face. Their ornaments consist of Job's tears, ear-rings of turtle shell, and head-muffs of cassowary feathers. They were armed with spears of palm-wood, gothic-shaped shields nearly 3ft. long, and stone clubs. At first they were friendly but afterwards appeared hostile.

The next river to claim attention is called the Mambare. This is simply one of the mouths of a river known as the Clyde of the Admiralty charts. It lies about two miles within the British territory, and in the lower part traverses some good alluvial land, abounding with remarkably fine fields of sago palms. The river was navigable by the steam launch for the first 40 miles where further progress was impeded by rapids, and some few miles further the channel is simply a succession of deep pools. Below the rapids some extensive areas of very fine alluvial land were met with, and the forest trees so high that the birds on the upper branches bade defiance to the marksman's firearm. Above the rapids the country is broken, and little agricultural land was to be seen. The district possesses a very fine climate. Sandflies and mosquitoes were entirely absent, and the early morning atmosphere was decidedly cool and bracing. The people have well cleared and cultivated gardens in which they plant taro, sugar-cane, edible hibiscus, yams, and bananas, but there were apparently no tobacco, papaya nor pumpkins. Several villages are located on the banks of the river, some of which are situated in the midst of beautiful groves of cocoanut and betel palms. The only ornamental shrubs met with consisted of a remarkably fine variety of light yellow crotons of great beauty. Ordinary water-cresses were met with at one of the villages, but they were seen at no other place on the north-east coast. The men were profusely ornamented with shells, pig's teeth, Job's tears, cassowary feathers, red seeds and bones. Some of the women wore a necklace or two, others a narrow mat-work belt, but they

were clothed with nothing else. In this part of the country they use the password "orokaiva," meaning "man of peace." They use an adze of basalt. Their pottery is not well prepared. It is without ornament, thick and slightly conical in shape. The people seemed to be industrious agriculturists, growing enough food for the entire population. They possess a great number of canoes. Sir William MacGregor is of opinion that some good agricultural land could be obtained for European settlement without interfering with native occupation, and he further believes that the natives would welcome European settlers who would be prepared to treat them fairly.

While in this part of the country astronomical observations were conducted by the Administrator for the purpose of determining the latitude of Mitre Rock, and it was found to be 8deg. 2min. 50sec. south, which places it about three miles within the British Possession.

The next place visited was a small sluggish river, 50 to 60 yards wide and two fathoms deep, called the Ope or Opera. The position of its mouth was found to be 8deg. 18min. 16sec. south latitude and longitude 148deg. 11min. 25sec. east. It is convenient for watering ships and of value to traders. Several villages were seen in the neighbourhood, and there was evidence of a large population of friendly natives. The men were nude, but the women were covered by a petticoat of native cloth. They were armed with spears and stone clubs, ornamented with wreaths of convolvulus and red hibiscus. They danced, sang, and shouted, but appeared to be very friendly. To the south of this district the Kumusi River flows into Holnicot or Gona Bay, in latitude 8deg. 28min. south and longitude 148deg. 16min. east. The mouth is obstructed by a bar some 4ft. below the surface. Most of the land on the lower part of this river is low and unfit for European cultivation, although considerable areas of alluvial deposits are occupied by many native gardens, and there are fine fields of sago palms. The highest point reached was about 46 miles from the sea, by traverse, or 8deg. 35min. south latitude and 148deg. 01min. 20sec. east longitude, where further progress was barred by rapids. Here the country "was, without exception, the most attractive" Sir William MacGregor

had "seen in New Guinea." Extensive tracts of splendid alluvial land stretched far and wide along the river valley, covered by forest trees, and to all appearance above the reach of flood. These flats occupy what was formerly the river bed as indicated by the sandy substratum. Some six miles from the river lay one of the central main mountain ranges, the intervening space being occupied by small mountain streams, numerous rolling wooded hills and flats. At night the air was pure and delightfully cool. Great reluctance was felt at having to leave such a district where the scenery is of a very fine description. There is apparently a large population here, but the people would no doubt be friendly. When descending the river the steam launch "Ruby" collided with a treacherously concealed snag and foundered. This unfortunate accident compelled the party to travel down an open unprotected coast in the whale and river boats. The Kumusi natives are unusually interesting. They are from a light to a dark bronze colour, not remarkably powerful people, but of fair Papuan physique. Their foreheads are square and rather high, with hazel eyes of fair size, large mouth, small chin, and flat cheeks and chests. The nose resembles that of the Port Moresby native, only slightly shorter, and the nostrils rather coarser. Both sexes wear cloth made from mulberry bark. They use stone clubs, the disc and the pineapple pattern, the palmwood spear with square-shaped sharp end and barbs on one side only, and small gothic shields, with a few examples of the great shield of Orangerie Bay. The stone clubs and adzes are made of basalt. They have no tobacco growing in their gardens, and were ignorant of its use. Their canoes are similar to those on the Ikore and Mambare rivers.

It was found that a river of considerable size enters the sea at Cape Sudest, but unluckily a bar closes its entrance to navigation. The natives call it Tambokoro.

The position of Cape Sudest was determined astronomically, and found to be in 8deg. 44min. south latitude and 148deg. 25min. 30sec. east longitude.

In Dyke Acland Bay three streams were discovered, Kevoto and Umundi creeks and the Musa River. The mouth of the first of these lies in latitude 9deg. 4min. 55sec. south and

longitude 148deg. 33min. 20sec. east. Both creeks are of little importance.

The lower part of the Musa River traverses low swampy country, covered by water when the river is flooded. When ascending this stream, the Administrator passed within a few miles of the western peaks of Mount Victory. "It has three principal summits, the western one of which is at present quiescent." Ashy-looking deposits were observed among the rocks on the others, and several large fumeroles out of which little spiral clouds of smoke were issuing. The highest point reached on this river was about 35 miles from the sea in latitude 9deg. 19min. 10sec. south and longitude 148deg. 53min. 43sec. east. Here the stream was about 100 yards broad, three fathoms deep, and the current two to three knots per hour. This place was evidently on the margin of a settled country. The banks of the river were beginning to rise, and the capacity of the channel was about sufficient to carry the water. The forest trees were very large. What the upper portion of the Musa basin may be is at present unknown, but the lower part appeared to be of little value. Several villages occupy the flooded country on the banks of the river ; the houses are built on stilts a few feet above the water. The natives were friendly, but naturally shy and suspicious. They excel in making native cloth, many specimens of which were obtained. Their dead are interred in the villages, the graves being covered with a neatly thatched cage. They use palmwood spears, stone clubs, and adzes of jade. Both sexes wear a native cloth. The men wear the hair long, hanging down the back. They cook their food in claypots, and eat lime and betel nut. The men were fairly strong and of good physique, but many were suffering from ringworm and hydrocele. They were anxious to trade and offered adzes, claypots, and sago for plane-irons.

Some veiy remarkable pottery was obtained on the north-east coast. The examples are bowl-shaped with outside raised designs not previously seen in any other part of British New Guinea.

Besides these explorations, to which your attention has been drawn, I may just remark that the discovery of Pennegwa Harbour, the extreme north-east of Rossell Island, and a safe

anchorage at Mabudauan, in the western part of the Possession, very greatly increases the value of our portion of the Papuan territory.

Sir William MacGregor said it was all very well for Mr. Thomson to say he would favour them with a few remarks, but it seemed to him, as far as the geography of New Guinea went, he had left very little to say. He had to thank Mr. Thomson and the Society for the way they now and hitherto had tried to make known to the world what knowledge had been available regarding the Possession. It was a countryman of his who some 2000 years ago uttered the aphorism, *Omne ignotum pro magnifico est*. He was inclined to think that, as far as the west coast was concerned, the aphorism ought to be inverted. It was certainly a very fine country on the north-east coast, and the Society deserved his thanks for the way it had tried to make his work there known. He was not going to say anything about the special geography of the country embraced by the paper, except on two points. The first was with regard to the Rev. Mr. Chalmers. In one of his despatches it would be found that he approved of the statement that the reverend gentleman did not obtain his description of the Purari from natives. He had in his despatch given Mr. Chalmers' citation, and he was satisfied that that gentleman had been in their locality. There was no doubt in his mind that he was in that portion of the country and that he traversed part of it in a native canoe. The second point was with regard to the river at the boundary of the German territory. What Mr. Thomson had said was perfectly correct, that he had some time ago named the stream the Boundary River. He had done so because he did not know any name for it, and at that time he had wished to believe it was inside the British territory. Later on, however, Mr. Thomson had mentioned the name of the river as the Ikore. That was the name the natives gave it, and it would be ungraceful for him to give a name to a river which was outside our boundary. While on the subject of naming rivers he might tell them the arrangement come to between the hydrographer and himself. Where they found old historic names they did not intend to change them. In other instances, where there were new European names which were of no specially historic interest, they would be changed to native names. (Hear, hear.) In cases where no names had been given he invariably tried to obtain the native name ; hence in the river before alluded to he had called it Boundary River, knowing that in course of time he would learn its native name. Numerous similar instances had come under his knowledge during the past few years. He found it was not always a very pleasant matter obliterating European names from maps. He had got into great trouble over it, and he thought it much wiser not to give names until they found that which was to be made permanent. He suggested that Mr. Thomson might follow up his paper with another. The one he had just read did not embrace all the latest work that had been done. His (Sir William's) despatches had not all been printed ; in fact, he questioned whether some of them had yet reached His Excellency the Governor. There was a great deal of information which

might be included in such a paper. For instance, Mr. De Vis had been examining a number of new and interesting native birds ; Baron Von Müller had got a lot of new plants ; but perhaps the most interesting, because the most practical, was the work being done by Mr. Jack and Mr. Rands. The geological specimens he had brought from the Purari River indicated a very large district in which there were very rich coal formations. The fossils that were under examination would show very clearly, he thought, the age of the deposit. They were also examining specimens from the mountains on the north-east coast. For a long time they had been unable to trace all the jade they came across. They could only come to the conclusion that in all probability it had its origin in the mountain range between the north and south. They had since found that that was so, but it was from the north side of the mountains it came, reaching the south side after the tedious percolation of trade. He hoped to turn this jade to good account ; for if it proved to be of fair quality we ought to be able to beat Burmah out of the market altogether. There were many other subjects that might be taken up which were now in the hands of scientific men. The Surveyor-General had many maps. There was one that would embrace the whole of the islands to the north-west of the Kiriwina Group, taking in all the islands we had. There still remained, however, a large amount of territory unexamined. There would be plenty for the Society to do for the next two or three years if it was going to keep abreast with New Guinea exploration, and make the work known. Its members seemed to have made up their minds to extend the knowledge, and in their efforts he wished them every success. (Applause.)

His Excellency Sir H. W. Norman moved a vote of thanks to Mr. Thomson for his valuable paper, and in doing so referred in pleasing terms to that gentleman's labours in the interests of geographical science. Mr. Thomson had written a great deal on the geography of British New Guinea, including the paper which he (His Excellency) had the pleasure of reading on his behalf at the Hobart meeting of the Australasian Association for the Advancement of Science. While admitting Mr. Thomson's willingness to help them to know something about New Guinea, he must say that great knowledge had been derived from the constant reports sent by Sir William MacGregor. (Applause.) These reports had been of great value, and had been published by the Queensland Government. Sir William had said he believed some of these reports had not yet reached him, but that evening, after returning from his walk, he had found three awaiting him. The number issued by Her Majesty's Government and the Queensland Government were legion, and in them Sir William had given comprehensive accounts of his explorations, including geology, botany, the customs and manners of the people—information, in fact, upon almost every conceivable subject. He did not think it would be possible for anyone but Sir William himself to concentrate all this knowledge in one reasonable volume, and he did not think he would for some time at least have the necessary time at his disposal to do this. He was glad to see Sir William there that night, and

to express their appreciation of his eminent services to the Empire. He was now going home for a few weeks, and he hoped that the brief respite would give him renewed strength and vigour to carry on the Government of New Guinea before the agreement between the British and Colonial Governments came to an end. (Applause.)

Sir William MacGregor thanked His Excellency. Whatever he had been able to do in New Guinea he owed almost entirely to the Government. In everything he had proposed or undertaken he had received from them full and complete confidence. He had received every possible assistance, and he felt confident he would continue to receive similar help. (Applause.

The Kamilaroi Class System of the Australian Aborigines.

[With Plate 1.]

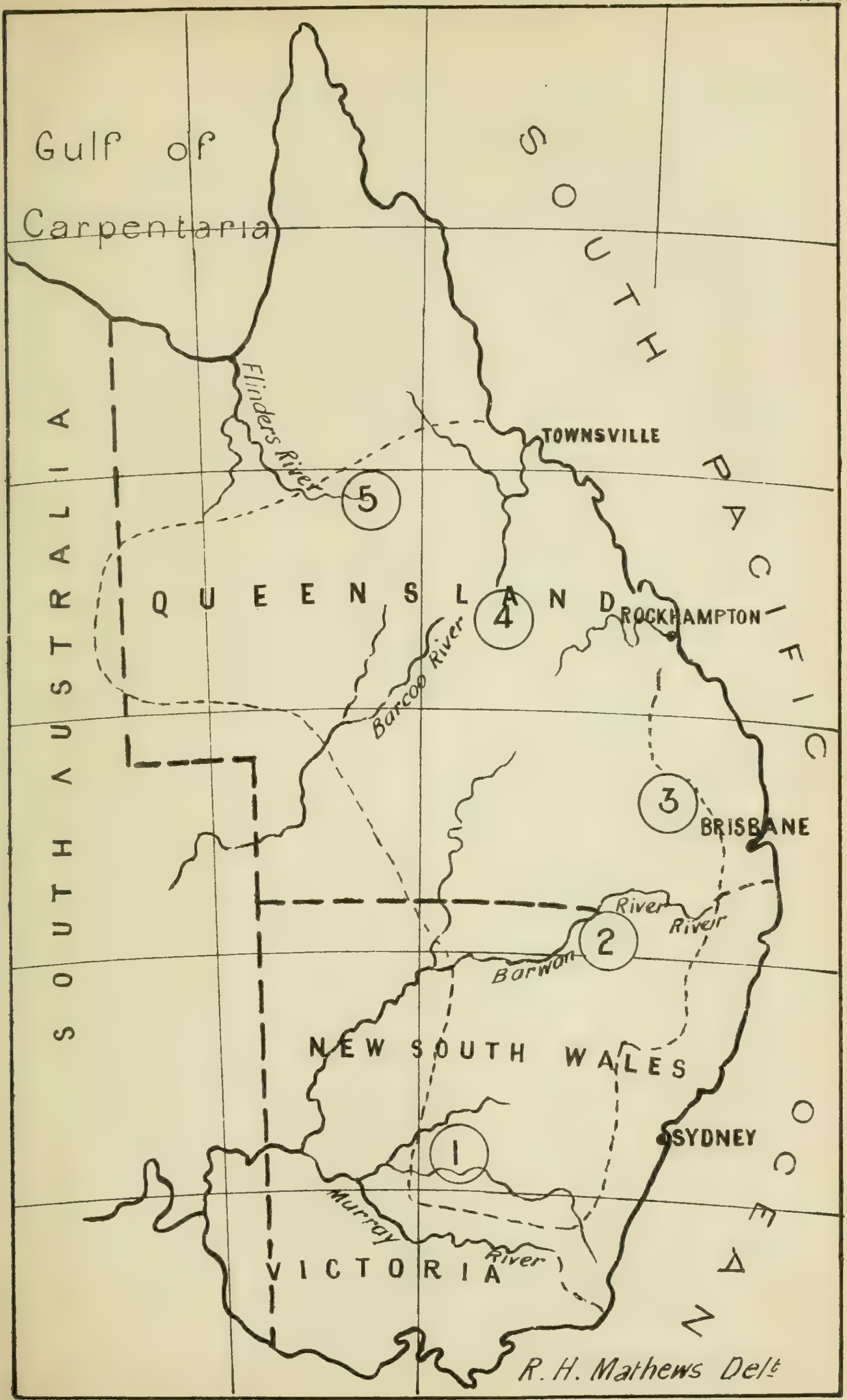
By R. H. Mathews, Licensed Surveyor.

(Read before the Royal Geographical Society of Australasia, Brisbane, November 16, 1894.)

As a general rule all Australian tribes are divided into two exogamous intermarrying classes, with subdivisions into smaller segments, each having a distinctive title. In cases where these divisions have been believed to be absent, it has probably been rather from their having escaped the notice of investigators than from their non-existence. These class divisions have been called organisations or systems. Among the social institutions of a primitive people there is none of greater interest and value to the anthropologist than the study of these class systems.

The Kamilaroi organisation, or type of class system, is the most important, and extends over a greater area of this continent than any other system with which I am acquainted. A reference to the sketch map, Plate 1, appended to this paper, will show that the aborigines belonging to this organisation occupy about half of New South Wales and more than half of Queensland.

As an example for the purpose of this memoir, I will take the Moree tribe on the Lower Gwydir River, New South Wales, shown as No. 2 on Plate 1, because it is situated within the region occupied by the original Kamilaroi tribes, and within which the Kamilaroi language was spoken. The native tribes speaking this language occupied a large tract of rich and well-watered country, extending from the Hunter River in New South Wales to the Maranoa River in Queensland, and constituted a community which was foremost in strength and importance among those of Australia. On the south they were joined by the Wiradjuri community, which was scarcely less numerous and powerful than themselves and having the same organisation. In the *Journal of the Royal Society of New South Wales*,


Gulf of Carpentaria
SOUTH PACIFIC OCEAN
SOUTH AUSTRALIA
QUEENSLAND
NEW SOUTH WALES
VICTORIA
TOWNSVILLE
ROCKHAMPTON
BRISBANE
SYDNEY
Flinders River
Barcoo River
Barwon
River
River
Murray
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5
4
3
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1
R. H. Mathews Delt

vol. xxviii., pp. 98-129, I have described the *Bora* or initiation ceremonies of the Kamilaroi tribes. In the Wiradjuri community, the equivalent ceremonies are known as the *Burbung*, a detailed account of which has been contributed by me to the *Journal of the Anthropological Institute of Great Britain.*

Division into Classes, &c.—The community within the district mentioned is divided into two primary classes, called Dilbi and Kupathin; the former is again divided into two sub-classes, called Murri and Kubbi; and the latter into two, called Ippai and Kumbo. Each boy and girl in the tribe is born under one or other of these four divisions. For example, in some families all the sons are Murri and all the daughters Matha; in others they are Kubbi and Kubbitha; in others, Ippai and Ippatha; and again in others they are Kumbo and Butha. The sub-class names of the women, it will be observed, are different from those of the men. The names of these classes and sub-classes may be different in different districts, as will be shown farther on, but the same system prevails.

Besides this division of the community into classes and sub-classes, there is another division of the sub-classes into lesser groups founded on the names of animals or some other natural object—as kangaroo, iguana, eagle-hawk, water, trees, wind, &c. —which from their analogy to the well-known North American tribal divisions have been called "totems." In the Moree tribe, which I have taken as my example, the totems belonging to one primary class also represent its sub-classes in common. Thus the totem kangaroo belongs to both Murri and Kubbi—these being the sub-classes equivalent to the class Dilbi (see Table A). Each class has not necessarily the same number of totems; one class may have many more than another. It has also been observed that some particular totem name will be borne by a large number of people, whilst the members of another totem will be numerically few.

Every aboriginal native has by descent a class and sub-class name, followed by that of his totem; these names he bears as one of a family to which they are common. In addition to the names he takes by descent, each blackfellow has his own proper individual name.

This division of the community into classes, sub-classes, and totems will be readily understood by referring to the following table, which represents the blacks on the Lower Gwydir River and adjacent country:—

TABLE A.

Classes.	Sub-classes.	Totem Names.
Dilbi ..	Murri Kubbi	Kangaroo, opossum, bandicoot, padamelon, iguana, black duck, eagle-hawk, scrub turkey, yellow-fish, horny-fish, bream, &c.
Kupathin ..	Ippai Kumbo	Emu, carpet-snake, black snake, red kangaroo, wallaroo, frog, codfish, and others

The above table shows that the primary class Dilbi is divided into the sub-classes Murri and Kubbi, and that the eleven totems there mentioned are common to these two sub-classes. The primary class Kupathin is divided into Ippai and Kumbo, and the seven totems given in the table are common to both these sub-classes.

The totem names are applied to family groups within the sub-classes, the members of which are considered of the same blood and descent, and each individual of one of these groups has the same totem name.

The individuals forming these classes, sub-classes, and totems do not collect into certain localities, separate from the other sub-classes and totems, but are scattered throughout the whole tribal territory—members of each class, and of course also of the totems, being found in all the local divisions.

Any animate or inanimate object may be a totem*—mammals, birds, fishes, reptiles, insects. We also find such objects as rain, trees, plants, lightning, wind, &c., among the totems of some tribes.

Everything in the universe belongs to one or other of the classes, such as the different kinds of trees, hills, plains, the sky, the heavenly bodies, &c. Students would do well, when opportunities offer, to tabulate as many of these as possible in different

* In many cases a man may not kill and eat his totem, but in other tribes he may eat it if killed by another.

parts of the country, as they may be found of some value in arriving at class equivalents, referred to in subsequent pages.

Tribal Divisions.—An Australian tribe is an organised society, governed by strict customary laws, which are administered by the headmen or rulers of the various sections of the community, who exercise their authority after consultation among themselves. Each tribe is made up of a number of families or groups, each of which has a local position in some part of the tribal country. The name of a tribe is usually derived from the locality it occupies; and although this local name remains constantly the same, the class and totem names of its members being transmitted through the women, change with each generation. This is the case where uterine succession prevails. In tribes with agnatic descent, the classes and totems are perpetuated through the men. Each of these divisions of a tribe has a headman, or chief, who in his particular locality is master; and these headmen, collectively, are the rulers of the tribe. Of them some one is superior to all the others, and is recognised as the headman of the whole tribe. When a number of these tribes are bound together by having the same, or nearly the same, class laws, participating in similar initiation ceremonies, and among whom intermarriage is more or less frequent, they form communities. Aggregates of these communities may be called nations.

There is no particular extent of country comprised in a tribe's domain—the area depends upon the character of the country occupied. In the large treeless plains of the interior, where game is scarce, and at times water also, the extent of country is larger than in mountainous coast lands where game is more plentiful and travelling more difficult. There are no very clearly defined boundaries between the tribes, or their greater aggregates, the nations—they seem to melt into each other.

Marriage and Descent.—Having given a brief outline of the classes, sub-classes, and totems, and their formation into tribes and communities, I will now endeavour to explain the rules of marriage and descent established in relation to these divisions. In most, though not in all, of the Australian tribes, descent is reckoned through the mother, a rule which is of very wide prevalence.

As already shown, the whole community is divided into two primary classes, Dilbi and Kupathin. These classes intermarry with each other, but each is forbidden to marry within itself. A Dilbi man marries a Kupathin woman, and a Kupathin man marries a Dilbi woman. In other words, the two sub-classes which, together, make up the primary class Dilbi, intermarry with the two sub-classes of which the primary class Kupathin is composed. For example where a man of the primary class Dilbi, of the sub-class Murri, and totem Kangaroo* married, he would take to wife a woman who was of the primary class Kupathin, of the sub-class Kumbo, and of the totem Emu.* (See Table A.) The children would be of the totem Emu, but in accordance with the rule of the sub-classes, which I have before referred to, would not be of the mother's sub-class Kumbo, but of the sister sub-class to it—namely, Ippai. The children, therefore, inherit the primary class name and totem name from their mother, but their sub-class name is determined by the class laws. I will again use a table for the purpose of illustration.

TABLE B.

A Male.		Marries	The Children are
Dilbi ..	Murri Kubbi	Kumbo (Butha) Ippai (Ippatha)	Ippai (Ippatha) Kumbo (Butha)
Kupathin ..	Ippai Kumbo	Kubbi (Kubbitha) Murri (Matha)	Murri (Matha) Kubbi (Kubbitha)

This table shows at a glance into what sub-class any other given sub-class may marry, and also the sub-class to which the children belong. In the second and third columns of the table, I have inserted the class name of the male, followed by that of the female in parentheses, on account of the class names of the men being different to those of the women as previously stated. The difference in the male and female class names tends to confuse the observer as to the line of descent, if not guarded against.

* I have assumed Murri to be of the totem Kangaroo, but he might happen to belong to any one of the eleven totems given in the table. Similarly, his wife, Kumbo, instead of being of the totem Emu, might happen to be of any of the seven totem attached to the class Kupathin.

It will be observed by this table that the intermarriage of the Murri and Kumbo classes gives Kubbi and Ippai in the next generation; and the intermarriage of Kubbi and Ippai gives Murri and Kumbo in the next generation. In other words, the two series of classes alternate from one generation to another; so that, practically, it is the intermarriage of the primary classes, Dilbi and Kupathin, each producing the other in continuous alternation.

The table also shows that the children belong to the primary class of their mother, and to the sub-class which, with hers, is equal to the primary class. For example, Ippai, of the class Kupathin, marries Kubbi (Kubbitha) of the class Dilbi, and the children are Murri—the sub-classes Murri and Kubbi making together the primary class Dilbi, being that to which their mother, Kubbi (Kubbitha), belongs.

The laws of marriage and descent are also governed by the totemic regulations which still further restrict a man in his choice of a wife; the rule being that marriage between persons of the same totem is not permitted.

There are also social laws which prevent a man marrying a woman who is held to be too near in blood to admit of a lawful union with her. For example, a man would not be permitted to marry the daughter of his mother's *own* brother, although she belongs to the group of women who, according to the class law, are his potential wives. He must marry a daughter of one of his mother's *tribal* brothers. Another obstacle to marriage arises out of local proximity by birth. In some tribes, a man cannot marry a woman of the same sub-tribe, although she may be of the proper sub-class for him to marry.

No man is permitted to take a wife until he has been duly admitted to the status of manhood, by passing through the initiation ceremonies of his tribe, and the permission to take a wife depends upon the consent of those old men who conduct the ceremonies.

The divisions into classes and totems have the effect of preventing consanguineous marriages by furnishing an easy test of kinship when the tribe has become so numerous or widespread that kinship could not otherwise be well determined.

The result of the marriage rules which I have endeavoured to explain, in passing every family through each of the four sub-classes in as many generations, and in preventing the intermarriage of near relatives, will appear on inspection of the following pedigree .—

1st generation— Murri marries Butha.
Their children are all

2nd— Ippai and Ippatha.

Ippai marries Kubbitha. Their children are
3rd— Murri and Matha
marries Butha. marries Kumbo.

Ippatha is married to Kubbi. Their children are
Kumbo and Butha
marries Matha. marries Murri.

4th—Ippai and Ippatha. Kubbi and Kubbitha. Kubbi and Kubbitha. Ippai and Ippatha.

By this table it is seen that persons bearing the name of any given sub-class reappear in the third generation, both on the male and female side; thus, in the pedigree given, Murri marries Butha. Murri's son is Ippai, and his grandson Murri, the same sub-class as his grandfather. An analagous result takes place on the female side; Butha's daughter is Ippatha, and her granddaughter is Butha, the same name as her grandmother. This gives rise to the useful rule that the boys take the sub-class name of their paternal grandfather, and the girls that of their maternal grandmother.

Although the rules of marriage and descent, according to the strict class law are as exemplified in Table B, yet there are variations or innovations which seem to be sanctioned among some tribes. The Rev. W. Ridley, at p. 161 of his work quoted elsewhere in this paper, says that among the Namoi river tribe, Murri Iguana could marry either a Butha—the woman whom the class laws permitted him to marry—or a Matha of a totem different to his own. The same privilege was extended, *mutatis mutandis*, to the men of the other sub-classes. I have myself observed similar innovations or irregularities in other districts.

A consideration of the foregoing rules of marriage and descent shows some curious results, among which the following may be enumerated :—

A mother and her children belong to different sub-classes, but to the same primary class. For example, the daughter of

Butha is Ippatha, and not Butha, as it would be if the children belonged to their mother's sub-class. Further, the children do not take either the class or sub-class name of their father; in all tribes having uterine descent the father is a mere nonentity, and is utterly ignored. In tribes, however, where descent is counted through the males, as in the Kaiabara tribe, the remarks in this paragraph as to a mother and her children, would, instead, apply to a father and his children.

Again, the children of a brother, and those of a sister belong to different primary classes and sub-classes; thus the children of Ippai have not the same class or sub-class names as the children of his sister Ippatha. Ippai's children are Murri and Matha, of the class Kupathin, but his sister Ippatha's children are Kumbo and Butha, of the class Dilbi.

With descent in the female line, a man's nephews and nieces are more nearly related to him than his own children, because the latter, actual or tribal, belong to a class allied to that of his wife; while his nephews and nieces, own or titular, are members of a class allied to that to which he himself belongs.

Relationship.—In these tribes marriage and relationship are conceived, not as between individual and individual, but as between group and group; the group being, in fact, the social unit. It is the group which marries the group, and which begets the group. It is not my intention to go into the question of relationship beyond that of cousins who are the children, actual or titular, of a father's sister, or of a mother's brother; and in order to place the matter clearly and unmistakably before my readers I will again use a table:—

TABLE C.

Man.	Marries.	Children.	Nephews and Nieces.	Cousins.
Murri	Butha	Ippai—Ippatha	Kubbi—Kubbitha	Kumbo—Butha
Kubbi	Ippatha	Kumbo—Butha	Murri—Matha	Ippai—Ippatha
Ippai	Kubbitha	Murri—Matha	Kumbo—Butha	Kubbi—Kubbitha
Kumbo	Matha	Kubbi—Kubbitha	Ippai—Ippatha	Murri—Matha

An examination of this table will show that a man can marry a cousin who is the daughter of his father's sister, or of his mother's brother, because she belongs to the class into which he

is entitled to marry; but he cannot marry the daughters of his mother's sisters, or of his father's brothers, for they are his tribal sisters, and belong, moreover, to his own class.

For the purpose of illustrating this group relationship, I will take a man of the Murri class as an example. All Murris and Mathas are his brothers and sisters; all Ippais and Ippathas are his sons and daughters; all Kubbis and Kubbithas are his nephews and nieces; all Kumbos and Buthas are his cousins—the latter being his potential wives. (See Table C.)

Dr. Tylor, in the learned article quoted in the "Conclusion" of this paper, says:—"In tabulating the nations of the world, I found a group of twenty-one peoples, whose custom as to the marriage of first cousins seemed remarkable; it is that the children of two brothers may not marry, nor the children of two sisters, but the child of the brother may marry the child of the sister." The Kamilaroi tribes are included in the peoples referred to by Dr. Tylor. The children of Murri marry the children of his sister Matha—or in other words, Ippai marries Kubbitha and Ippatha marries Kubbi. Murri's children cannot, however, marry those of his brother; and in like manner the children of Matha are prohibited from marrying those of her sister for the reasons stated in the explanation of Table C. It will also be seen by this table that a man's sister's children are his nephews and nieces; Kubbi, the son of Matha, is the nephew of Murri, and so on. As before stated, a man's brother's children are his own tribal children. In a similar manner, a woman's brother's children are her nephews and nieces, but her sister's children rank as her own.

Intermarriage of the Totems.—When the Rev. W. Ridley recorded the class names, and the laws of intermarriage connected with them, it was seen that these laws were very complicated. They have since been worked out with more or less success by different writers, but even now there is probably not a single case in which all the laws which govern the classes, the sub-classes, and the totems—and which regulate their intermarriage, and the course of descent in them—have been fully and completely recorded and explained.

That the totems influence marriage and descent is well known, but the manner in which it is done has not hitherto been shown,

because this branch of the subject has not received sufficient attention.

The work which is most important and necessary to be done at the present time, is to accurately trace out and formulate the details of the laws which rule the intermarriage of the totems, and the distribution of these totems under the four classes. This should be done at once, because the old blacks are the only ones who know precisely what these laws are—when they die the knowledge will be lost for ever. Thus it becomes of especial importance that now, while there is still opportunity for doing so every detail should be recorded which it is possible to learn respecting these class and totemic divisions.

For the purpose of assisting those who may have the opportunity, and are willing, to join in these investigations, I will show how the totems are distributed under the four classes of the Kuinmurbura tribe, near Rockhampton, Queensland, together with the laws of intermarriage and descent of the totems. This will be found a convenient way of tabulating the information collected in each case which may come under the notice of the observer :—

	Male.	Marries	Children are
Yungeru.	Kurpal—eagle-hawk	Karilbura—hawk	Munal—hawk
	Kurpal—laughing jackass	Karilbura—curlew	Munal—curlew
	Kuialla—eagle-hawk	Munal—hawk	Karilbura—hawk
	Kuialla—laughing jackass	Munal—curlew	Karilbura—curlew
Witteru.	Karilbura—curlew	Kurpal — laughing jackass	Kuialla — laughing jackass
	Karilbura—clear water	Kurpal—eagle-hawk	Kuialla—eagle-hawk
	Karilbura—wallaby	Kurpal — laughing jackass	Kuialla — laughing jackass
	Karilbura—hawk	Kurpal—eagle-hawk	Kuialla—eagle-hawk
	Munal—curlew	Kuialla — laughing jackass	Kurpal — laughing jackass
	Munal—clear water	Kuialla—eagle-hawk	Kurpal—eagle-hawk
	Munal—wallaby	Kuialla — laughing jackass	Kurpal — laughing jackass
	Munal—hawk	Kuialla—eagle-hawk	Kurpal—eagle-hawk

The above table shows that the tribe is divided into two primary classes, Yungeru and Witteru, to each of which there is attached a group of totems. Yungeru is again divided into the sub-classes Kurpal and Kuialla—and Witteru is divided into Karilbura and Munal. Karilbura Curlew marries Kurpal Laughing Jackass, but Karilbura Clear-water marries Kurpal Eaglehawk, and so on. The table also shows to what totem the children belong.

A complete table, similar to the above, ought to be prepared in regard to every native tribe which we may have opportunities of accurately observing. I must, however, remind the reader that custom varies very much, and that it is never safe to assume that the practice in any one tribe will be found the same in other tribes. The practices of each tribe should be studied independently. The tendency to generalise from the study of one tribe has caused much confusion. Thorough and systematic collection of data can alone give a reliable groundwork for generalisations.

It remains for investigators to systematically collect the data necessary for a complete tabulation of the classes and totems of all the tribes, and an exposition of their mutual relations and significance. Totemism has not yet received that thorough study it deserves. It requires a vast amount of patient work, covering a very wide field, collating and comparing information from every part of it.

Other Tribes.—These notes were at first intended to deal only with the classes among the aborigines on the Lower Gwydir River and adjacent country, but I have thought my paper would not be complete without referring briefly to the class divisions and totems in other parts of the continent in which the Kamilaroi organisation obtains. I have, therefore, selected a few tribes located in districts far apart—the two extreme cases being separated by over a thousand miles in a direct line.

The Wiradjuri community (No. 1 on Plate 1) which in former times was both numerous and important, occupied a wide tract of country extending from somewhere about the Murray or Murrumbidgee almost to the Barwon, where they were joined by the great Kamilaroi community. On the west they were bounded by the Barkinji tribes. The Wiradjuri have

the Kamilaroi organisation into four classes; there are probably two primary divisions, but I have not yet succeeded in obtaining satisfactory information on this point. The class names are identical with those of the Kamilaroi, but the rules of marriage and descent are somewhat different, as will appear by inspection of the following table:—

A Man.	Marries	Children are
Murri	Ippai (Ippatha)	Kumbo (Butha)
Kubbi	Kumbo (Butha)	Ippai (Ippatha)
Ippai	Murri (Matha)	Kubbi (Kubbitha)
Kumbo	Kubbi (Kubbitha)	Murri (Matha)

Murri and Kubbi have a group of totems, and so have Ippai and Kumbo. Descent is in the female line, the children taking the name of the sister sub-class to that of their mother—the same as in the Kamilaroi. The initiation ceremonies of the Kamilaroi and Wiradjuri communities are likewise very similar.

The next tribe to be mentioned is the Kaiabara, in the Bunya Bunya Mountains, about 50 miles north-easterly from Dalby, in Queensland. (No. 3 on Plate 1.) This tribe is divided into two primary classes and four sub-classes, with totems, framed after the Kamilaroi type, but with male descent. As this is the only tribe having agnatic descent which I shall at present enumerate, I will give the classes and sub-classes in full in tabular form:—

Class.	Sub-class.	Marries	Children are
Dilebi ...	Baring	Bunda	Turowain
	Turowain	Bulkoin	Baring
Kubatine ..	Bulkoin	Turowain	Bunda
	Bunda	Baring	Bulkoin

This table clearly shows that descent is in the male line, for the children are of the same primary division as their father, and of that sub-class which, with his, is equal to the primary division.

It will be noticed that the names of the primary classes in this tribe are almost identical with those of the Moree tribe, although distant about 300 miles from each other.

Farther north on Elgin Downs, Belyando River, Queensland, is the Wakelbura tribe (No. 4 on Plate 1) with the Kamilaroi organisation, but having the names of the classes and sub-classes dialectically different. There is a group of totems to each class, and descent is counted through the mother. The primary class, Mallera, is divided into the sub-classes Kurgila and Banbe, and the primary class Wuthera is divided into Wungo and Obu as shown in the following table :—

Class.	Sub-class.	Marries	Children are
Wuthera ..	Wungo Obu	Banbe Kurgila	Kurgila Banbe
Mallera ..	Kurgila Banbe	Obu Wungo	Wungo Obu

It will be seen that the rules of marriage and descent in this tribe are precisely the same as in Table B, but the names of the classes and sub-classes are entirely different.

Still farther to the northward is the Yerrunthully tribe, on the head of the Flinders River, near Hughenden, Queensland. (No. 5 on Plate 1.) This tribe has uterine descent, and is divided into four classes, with a group of totems attached to each. The names of the classes are as given in the subjoined table :—

A Male.	Marries.	Children are
Woonco Coobaroo	Bunbury Kurgielah	Kurgielah Bunbury
Kurgielah Bunbury	Coobaroo Woonco	Woonco Coobaroo

The similarity in the class names of this and the Wakelbura tribe is worthy of remark. Over a large extent of Eastern Australia the names of the primary classes or sub-classes

are the same, under slight variations, although the languages of the tribes using them may be more or less divergent. This applies also to the Kaiabara tribe.

I have not given the totems attached to the classes in any of these tribes because they are not yet fully known. I think it better to omit them altogether for the present than to give an incomplete list. I hope others will be able to supply full information in regard to such of the tribes as they may be acquainted with.

Other tribes could be given, but a sufficient variety has been selected, at points widely separated, to enable the reader to deal with any case which may occur in the course of his investigations in the country comprised within the Kamilaroi organisation.

Equivalent Classes.—In examining the class divisions of the Kamilaroi, Wiradjuri, Kaiabara, Wakelbura, and Yerrunthully tribes, it is found that there are dialectic differences, more or less, in the names of the sub-classes. When a certain class in one tribe holds the same place in the system as a class in another tribe, they are said to correspond or be *equivalent* to each other. Thus, in the following table, the class Murri in the Kamilaroi tribe is said to be equivalent to Murri in the Wiradjuri tribe or Barang in the Kaiabara, or Wungo in the Wakelbura, or Wunco in the Yerrunthully tribe; in other words, these classes are the equivalents of each other. If these were neighbouring tribes, and a man of the Murri class, for example, were to go and settle in the Kaiabara tribe, he would take his position in the Barang class, and if he went to reside with the Wakelbura tribe, he would rank in the Wungo class, and so on. Class corresponds to class in meaning and in privileges, although the names may be quite different and the totems of each dissimilar. The following table will show what classes are equivalent to each other in the five tribes mentioned :—

Kamilaroi.	Wiradjuri.	Kaiabara.	Wakelbura.	Yerrunthully.
Murri	Murri	Barang	Wungo	Woonco
Kubbi	Kubbi	Turowain	Obu	Coobaroo
Ippai	Ippai	Bulkoin	Kurgila	Kurgielah
Kumbo	Kumbo	Bunda	Banbe	Bunbury

If the totems of each of these tribes were fully known, it would probably be found that there are also variations in the character and number of their totems, and equivalents might be found among them to totems in the other tribes. It is, therefore, necessary to enquire into this question.

In the case of the intermarriage of the Kaiabara tribe, which has agnatic descent, with any of the others, in which descent is uterine, it is not yet clearly known what line of descent the children would follow. This part of the subject requires investigation.

Other Class Systems.—This paper, as its title implies, professes to deal only with the Kamilaroi organisation, but in order to bring the subject of the class systems of the Australian aborigines more fully before my readers, I will briefly refer to some of the other systems. The next most important organisation to the Kamilaroi is the Barkinji, which adjoins it on the west, from the Murray River to the boundary between Queensland and South Australia. The Barkinji system has two primary classes, without any sub-classes, but with groups of totems attached to each class, and having uterine descent. On the Darling River the class names are Mukwara and Kilpara, but these names vary in different districts.

Adjoining the Kamilaroi system on the north, and extending to the Gulf of Carpentaria, there are, amongst others, a number of tribes having four classes, with agnatic descent, but the particulars of the structure of their class system has not yet been accurately determined. It is hoped that some of the residents of the "Gulf country" will endeavour to formulate the details of the laws which govern the intermarriage of the classes and totems, as well as the equivalents of both these, among the tribes referred to.

There is a wide field for the student of anthropology in Northern Queensland, and in the country between there and Port Darwin in the Northern Territory of South Australia. In many parts of the continent, the native tribes are dying out, and with them is perishing information of the highest anthropological value. As for extinct tribes there is nothing to be done; but among the natives of the districts I have mentioned, a prompt

and minute investigation would save some valuable details and fast-fading memories of their social laws and customs. Among the owners of runs and stations in the back country of Australia, very few men have been found capable, and still fewer willing, to take the trouble to thoroughly master the details of the class systems.

Conclusion.—The Australian class systems have been commented upon by various writers in different scientific works in Australia and in England. The class names of the Kamilaroi tribes were, it is said, first observed* by Mr. T. E. Lance, who informed the Rev. W. Ridley of them, and to the latter belongs the credit of accurately tracing out and formulating their details which he published in his work, *Kamilaroi and Other Australian Languages*, pp. 161-165. Among subsequent writers may be mentioned the following gentlemen, who have contributed articles referring to this subject to the *Journal of the Anthropological Institute of Great Britain*:—Mr. C. S. Wake on "The Origin of the Classificatory System of Relationships among Primitive Peoples," vol. viii., pp. 144-180; the same author on "The Nature and Origin of Group Marriage," vol. xiii., pp. 151-161; Mr. A. W. Howitt in "Notes on Australian Class Systems," vol. xii., pp. 496-512, and vol. xviii., pp. 31-70; Mr. E. Palmer in "Notes on Some Australian Tribes," vol. xiii., pp. 276-347; Mr. A. L. P. Cameron in "Notes on Some Tribes in New South Wales," vol. xiv., pp. 344-370; and Dr. E. B. Tylor "On a Method of Investigating the Development of Institutions, applied to the Laws of Marriage and Descent," vol. xviii., pp. 245-271. The Rev. L. Fison has written on this subject in various Journals and other works.

That free use of the papers just quoted has been made, which no doubt their authors intended should be made of them, and it is desired in this place, instead of by foot-notes throughout the paper, to acknowledge the obligations to the authors mentioned. It is hoped that other investigators may make an equally good use of the present paper.

* Sir George Grey, when exploring in what is now called Western Australia, in 1837-39, in speaking of the aboriginal tribes there, says:—"The natives are divided into certain great families, all the members of which have the same names. * * * Each family adopts some animal or vegetable as their *Kobong*, as they call it."—*Two Expeditions in N.W. and W. Australia*, vol. ii., pp. 226 and 228.

The want of a short and practical treatise, simply and intelligibly arranged, in which the principles of the class divisions and totems are clearly stated, and the laws of marriage and descent lucidly laid down, as far as at present known, has long been felt and complained of by residents in the back country and elsewhere, who are willing to help us in this inquiry. It is with a view of supplying this want that the present paper has been prepared, and if a careful study of its pages should have the effect of inducing gentlemen living in districts where the blacks are still sufficiently numerous to furnish opportunities for observing their customs, to collect full and exact information on the points indicated, my work will be amply rewarded.

On the word "Kangaroo."

By C. W. De Vis, M.A.,

Curator Queensland Museum.

(Read at a Meeting of the Royal Geographical Society of Australasia, Brisbane, November 16, 1894.)

Indubitally the highest purpose of the science of words is to minister to the science of mind; its ministerial function in chief to trace utterance to its origin in thought. Such is the opinion reflected in the counsel given to us by a late writer:—"To observe and mark the external peculiarities and diversities occurring in languages is no doubt of very considerable importance, because without a minute knowledge of the details a proper insight into the total cannot be obtained; but such a proceeding ought to be supplemented by an investigation into the causes which produced these peculiarities."*

In the language of our Myall race we have opportunities to act upon this advice and, in the state of our knowledge of the original thought below the surface of the language, reason to act. The verbal elements of the tongue have been plentifully supplied to us by interpreters, and if grammars of it were as numerous as the vocabularies the greater part of its machinery would be better known to philologists than it is even to those few of us who by personal intercourse with the natives have acquired a practical knowledge of one or two of its dialects. But its idiosyncracies have been but little studied. We may speak it and to speak it think in it, but as foreigners we think in it in our own fashion. The psychological side of it, the mental instincts expressed by it, are as little considered by us as they probably are by most of the natives themselves. These mental habitudes, if there be any peculiar to the language, claim our interest as students of the intellectual development achieved by the Australian savage in his unsophisticated state—shame to us, pretenders to civilization, justice, and mercy, that we shall soon have to say—in his living state.

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* G. Oppert. Anthr. Inst. Journ., vol. xiii., p. 35.

The work on *The Australian Race*, left to us by the late Mr. E. Curr, is an instructive compilation. Consisting mainly of vocabularies, it largely supplements the several excellent collections of words previously extant, and its numerous lists of equivalents for selected words are very helpful to enquiries depending on collation.

At p. 28, vol. 1, the author has some remarks on a peculiarity inherent in a few of the native words for "kangaroo." This appears to have been the first notice of it in print, though there is no doubt that the present writer is very far from being the only one who was previously aware of it. However that may be on seeing that Mr. Curr had thought it worth while to draw attention to it he began to think that it might be well to look further into the matter. Accordingly, he devoted some hours of recreation to the subject, and is not altogether without hope that the result may be worth some moments of attention on the part of those who take an interest in the science of man—and who of us does not?

Mr. Curr, in the place cited and other parts of his work, merely brings under notice the identity or great similarity between some words for *kangaroo* and *man*. On investigation it is found that this represents the truth to a very limited extent, inasmuch as the notion so indicated, namely that man, as known to the speakers, stands in some relation of kinship to the kangaroo, is much more prevalent than was supposed, and moreover included not the men of the race only but man in almost all his conditions of age, sex, and family relationships, woman, old man, young man, old woman, young woman, father, mother, elder brother, elder sister, younger brother, younger sister, and even baby.

Our use of the word "kangaroo" dates from the landing of Captain Cook at the Endeavour River. It has for a long time been supposed that the word was then obtained by mistake. It is affirmed that it was given by a native who being asked the name of the animal naturally replied to an enquirer of whose language he was ignorant, "kangaroo," "I don't understand." Whether this account of the origin of the English name of the animal was first suggested or subsequently confirmed by the discovery that 40 years later no such word for kangaroo was

in use on the Endeavour River, I am not in a position to say, but it is certain that the vocabulary then compiled by Captain King gives the quite different word, "menuah." But in any case no such fanciful explanation of the apparent discrepancy was needed. We have a perfectly natural one in the well-known aboriginal custom of ceasing for a time to use a word which has served for the name of a tribesman lately deceased. In point of fact the word "kangaroo" is the normal equivalent for kangaroo at the Endeavour River; and not only so, it is almost the type form of a group of variations in use over a large part of Australia. And this group is one of several into which most of the known words for kangaroo, some 262 in number, could, if requisite, be arranged according to their root consonants. This might now be done with the view to show which of the words in each group are also significant of some phase of humanity, but as this double meaning is all we want to know from them at present, it will be better to tabulate them under the relations or conditions of man to which they are appropriated.

Before proceeding to do so, a premonitory word is desirable. In strict usage the name of the dialect, or of the tribe speaking it, ought to be given whenever a word found in a vocabulary is brought forward for a purpose, but as this course would prove extremely tedious it should be avoided if possible, and as most of the words to be adduced are given in Curr's vocabularies, the number of the vocabulary in Curr's volumes containing it will perhaps be thought a sufficient reference for any one of them.

WORDS FOR *KANGAROO* AND *MAN*.

(1) Practically the same in the same dialect:—

Kangaroo.	*Man.*
16—yongar	yongar
19—yongar	youngar
18—yungar	yungar
20—yungar	yoongar
24—yungar	youngar
21—younga	younga
30—yongo	yongar
26—yonger	nunger
24—yonger	yoongar
24—yonger	nungal
31—younger	noongar

(2) Comparable in same dialect:—

7—ipamoo	imbamoyu
90—boongana	yungunna
143—murghoo	murree
37—murrui	maii
2—marninganauya	barning
167—dgin	dthun
89—jacojaco	choigno
127—woora	kooroon

(3) Practically the same in different dialects:—

164—murree	murree, 143
107—coola	kooli, 207a
167—dgin	dine (Yowalerie)
	dhan, 166
49—beango	bang (Kulkyne)
	beng (Balmoral)
210—girra	girree (Tangambalanga)
200—kora	kare (L. Macquarie)
127—woora	woorin (Preeagalgh dialect)
209*a*—koim	koliin, 266
210—jirrah	girree (Tangambalanga)
214*b*—wortagoa	wortungi (L. Tyers)
	(Tyntynder)
5—loityo	woito-bullar (Witouri)

(4) Comparable in different dialects:—

6—kernoo	karne (L. Copperamana)
52—kulla	koola, 182
38—kaowla-gong	kooloying (Crawford, R.)
6—kulumba	koolein (Yarra)
17—yunkera	nunca-berrie, 10
89—jacojaco	yago, 13
109—menuah	munya (Mt. Elliot)
113—minya	munya (Mt. Elliot)
126—arragoo	arargbee, 4
27—murrui	murree, 143
210—girra	jere, 213
wurak (Perth)	yura (Pt. Lincoln)
	yuree, 114
241*c*—tanjectcoopna	dhan, 166; daan, 162
	tyan, 163

WORDS FOR *KANGAROO* AND *WOMAN*

(5) Comparable in same dialect:—

28—marloo	ngarlo
87—buloker	bolko, 86
86—broolach	bolko
110—darbar	dalbo

(6) Comparable in different dialects :—

24—yungar	yungoora, 125
	youngaroo, 143
155—naralko	ngarluk, 12
10—mungaroo	munkera, 42
121—wungunnia	wooanoo, 89
89—jacojaco	yokka, 25
83—badjeerie	badjer, 209a

WORDS FOR *KANGAROO* AND *YOUNG MAN*.

(7) Practically the same in different dialects :—

50—thuldara	thuldera, 81
208*i*—koraa	karaa, 161

Comparable in same dialect :—

2—mearninganaaya	mearningana
149—booroo	wooroo
187—womboit	boombut
155—narrago	nungar
155—narco	nangoo
155—nargoo	nunger
80—thurlda	taldra
81—turtla	thuldera
210—girra	geraiel
210—djeerah	geraiel

Comparable in different dialects :—

206—kore	kuar, 159
107—coola	koolermundi, 18
49—beango	meangena (Adelaide R.)
174—narragoo	agarthar, 15
87—buloker	buckallee, 10
50 -thaldera	taldra, 80

WORDS FOR *KANGAROO* AND *OLD MAN*.

Comparable in same dialect :—

69—chuckaroo	karu karu
88—boolyoker	beuk
39—uggera	ugneranna

Comparable in different dialects :—

24—yungar	unger, 2
145—woora	madoora, 158
37—arinya	ugneranna, 39
69—chuckaroo	kyearroo, 177
89—jaco jaco	yagoo, 15
207*a*—miingun	mongan, 18
59—oodloo	oodlally, 63
214*b* 1—wortogoa	worto, 79
goora (Jajowerong)	magoora, 127

WORDS FOR *KANGAROO* AND *OLD WOMAN*.

Comparable in same dialect:—

166—mari	marun
113—minya	binga
10—mungaroo	munga
102—muttchumbar	muttchuchu

Comparable in different dialects:—

207*a*—miingun	mungun, 19
102—muttchumbar	moitchu, 104
126—arragoo	arkootcha, 37

WORDS FOR *KANGAROO* AND *YOUNG WOMAN*.

232—koorengi	kooree, 10

WORDS FOR *KANGAROO* AND *FATHER*.

Comparable in same dialect:—

65—kudla	ludlaw
37—oggra	ognega

Comparable in different dialects:—

186—warperer	ngarperi (L. Copperamana)
12—yowerda	yowardee (Ngoorie dialect)
65—kudla	yedla (Mt. Remarkable)
7—ipamoo	amma, 14; amo, 13; ammatha, 15

WORDS FOR *KANGAROO* AND *MOTHER*.

Comparable in same dialect:—

10—mungaroo	nunga

Comparable in different dialects:—

89—jaco jaco	yakoo, 28
174—narragoo	agootha, 15
91—majumba	ngumba (Kamilaroi)
145—woora	weire (Venus Bay)
10—mungaroo	mernoo, 101

WORDS FOR *KANGAROO* AND *ELDER BROTHER*.

Comparable in same dialect:—

60—ooloo	oowellie
93—orthur	aling-other
82—boololea	berlwea
9—badjeerie	kijerri, 10

Comparable in different dialects:—

14—yoorda	koorda, 28

WORDS FOR *KANGAROO* AND *YOUNGER BROTHER*.

Same in different dialects:—

208*d*—koora	koora, 27

Comparable in same dialect:—

10—mungaroo	mungardo

WORDS FOR *KANGAROO* AND *SISTER*.

Comparable in same dialect :—

99—kooroô	coobamoo

WORDS FOR *KANGAROO* AND *ELDER SISTER*.

Comparable in same dialect :—

38—augara	coongari
37—oagara	koongara
34—koolbirra	woolaroo
100—mongerongo	murno
96—ngulanoo	koolamoo
99—ngulana	koolamoo
107—cutchira	coorcorminya
114—yuree	yabooroo
181—bundar	bugandi
207*d*—korai	korokai

Same in different dialects :—

42—koongoora	koongoora, 38

Comparable in different dialects :—

112—avari-nowo	avaru, 373
38—wallaru	baye-wallaroo, 35
207k—kooroo	coobamoo, 99
42—koongoora	coungeri, 39
koongoora	koongajura, 11 (this dialect has no word for kangaroo)
46—choockeroo	chukan, 17
choockeroo	chukunporan, 16
choockeroo	jukunborang, 18
10—mungaroo	mookono, 89
214*b*—wortagoa	wertooki, 74
214*d*—wardakow	wurkoo, 4
174—narracoo	narrabutha, 15
174—narragoo	naranbar, 14
154—bowra	buerra, 1
209*a*—maram	marumba, 13
quarra (Perth.)	quarangel, 31
quarra (Perth.)	quarratchook, 33

WORDS FOR *KANGAROO* AND *BABY*.

Comparable in same dialect :—

174—narracoo	naryloo
150—oora	wangoora
148—woora	wooer
214*c*—tanjut coopna	kotoopna

Comparable in different dialects :—

143—woea	wooer, 148
208*g*—waamha	yamba, 12

Sufficient data have perhaps been given to induce the belief that in the minds of the originators of the Myall tongue there was a recognition of intimate relations existing between man and the kangaroo. A more exhaustive comparison of the vocabularies we possess would no doubt enlarge the lists of comparable words ; the addition of vocabularies from tribes yet unknown or unstudied will inevitably enlarge them still more. And though on the other hand they may have to be weeded to some extent by eliminating errors existing in the vocabularies themselves, and these are by no means free from error, mere coincidences of speech, and in a multitude of dialects such coincidences have probably arisen, and words alike in sound but proveably different in origin ; still, after making every fair allowance for misconception and chance, a residuum will be left large enough and significant enough to prove our position.

In these lists there are cases in which the full significance of the words is not brought into view by their mere collocation ; for instance, ipamoo for kangaroo corresponding to imbamoyu "man" in the same dialect, where ip-amoo is a modification made by the prefix "ip" of the word for "father," in other dialects "amma," itself an abbreviation of mamma. In woratogoa again we have a modification of wirto, elsewhere "old man" ; the same root in wirtungi, adult man, and almost the same form in wirtooki, elder sister, in which the idea of superior age is prominent. So that the word wortagoa is the exact equivalent for our own expression "old man kangaroo." The same root is corrupted into woitu in woitubullar, "old folk," for *man*, and still further into loitu for *kangaroo* in another dialect. The extent of the interconnection of such words must therefore not be thought limited to the words associated with them in the lists.

A large number of forms for kangaroo, consisting of variants of goora, kore, korne, oora, woora and the like are remnants of the complete words kangooroo kangoora, and with other variants in the shape of yangor, yungar, nungar, mungar, serve to show how very prevalent this type was over the rest, none of which have a range approaching it in extent. We may, perhaps, judge from this that it was the original word used by the race before it

spread and divided off into tribes, of which some lost and others retained it.

It should not be overlooked that the root of kangar reappears in Melanesia as the root of the racial name kanaka in which it signifies *man*. Further that the equivalent djin for kangaroo, bracketed with the equivalents for man djan, dan, recalls the name of the island Tanna, and the same word in tanata as the Maori word for man. It would be a very curious coincidence if the ancestral Myalls gave the kangaroo names applied to man in the New Hebrides and New Zealand, with no intention of signifying by them that they considered the beast in any way related to man; even if we suppose that their descendants' use of the same words for man was but another coincidence. No anthropologist nowadays supposes that the occurrence of like words in distinct tongues proves a direct connection in the past between the races speaking them; but though we may not say that the Myalls derived the words from the more eastern race or *vice versa*, it may be allowable to surmise that both races inherited them from a common ancestry wherever seated.

The most essential part of our task to discover the cause of the mental peculiarity which associated the kangaroo with man is the most difficult, but failure on our part will perhaps pave the way to success for another enquirer.

Thanks to the involuntary researches of the thousands of prospectors, who have probed a great part of the surface of Australia, we know enough of our post-tertiary deposits to say that either the extinct animals found in it were older than the reindeer and mammoth of Southern Europe and the glyptodon of South America, or man made a later entrance into this than into either of those parts of the world. So far as negative evidence goes, he was not in contact with the great marsupials of the Darling Downs, or even of the Wellington Caves. Considering that as a fossil animal we know nothing of him here, we cannot but think that, notwithstanding the proximity of the eastern limits of the anthropoid apes, man, if he derived his origin from that stock, did not spread from it in our direction; and considering both the improbability that he had more than one centre of origin, and that anthropoid remains also are

equally absent from our post-tertiary deposits, we may opine that humanity found its way to Australia not by evolution but by immigration. As there is no probability that our extinct fauna belonged to an earlier period than that of Europe or America, it would seem that the ancestors of the Myall race arrived here at a comparatively late date, most probably when the other animals to be met with in their new home were much the same as now, for there is nothing in language or myth to lead us to surmise that the race has even a legendary remembrance of anything bulkier than a kangaroo, or more harmful than a native cat. The first comers must have been as much impressed by the largest of the strange animals encountered by them as Europeans were long ages after, but for a very different reason. It was not to them a curiosity of natural history, a phenomenon in biology, but a most practical and valuable friend, yielding them flesh, skin, bone, and sinew for their use abundantly and unresistingly—with far less trouble and risk than did the buffalo to the American Indian. Was it that the recognition of these virtues reacted on the savage mind, and induced it to confess the like brotherhood between giver and receiver as obtained in their human experience? As a rule the savage respects those animals only whose powers of destruction make them objects of his dread; regarding the benefits derived from innoxious sources as a matter of course, he feels nothing but indifference towards them. It is to his fierce compeers that all his respect seems due. Thus the Hindoo suffers quietly under the cruel ravages of his great foe the tiger, and should one be slain he apostrophises the dead body or its spirit in hypocritical terms of affection? "My father," "my uncle," and excuses himself for depriving it of life or habitation. Yet, occasionally, man displays feelings of reverential gratitude towards the beast on which he mainly depends for subsistence. Witness the cow-cult of the Todas. But to pay divine honours, a race must have achieved the idea of divinity. Everything must have a beginning, and possibly the first step towards the apotheosis of the kangaroo was taken when it became associated by name with an incipient god-maker. But, meanwhile, its brotherly kindness was acknowledged by its adoption as far as possible into the human family. Behold the debasement of these

benighted savages in confessing themselves akin to a kangaroo! But so it is with man till in the pride of his superiority he asserts that he has nothing in common with the brutes that perish. Primitive man, even in his modern representatives, draws no such consequences from his standing among the animals around him. He knows that they understand each others' voices, and though their speech is unintelligible to him so is that of a distant tribe of his own blood. As for *articulation* he knows not the word. In cunning he often finds himself outmatched by the beasts he would circumvent, and the invention of a sharp-edged stone or a pointed stick for a spear is not proclaimed with the flourish—"See how immeasurably, how radically distinct we are from the brutes!" There is in short nothing to prevent entire fraternisation with the brute but the brute's inability to give a *quid pro quo* in terms of consanguinity.

There is perhaps a further reason why the Myall should recognise a relation in the kangaroo. He must have been greatly struck on his first arrival with the apparition of a weird animal seated on the ground, with body erect, and arms in free motion, probably utterly unlike to, and much more human-like than any beast previously known to him—so human-like that he may have fancied it a patriarch of the land he was invading, to be addressed in terms of equality or honour, and the notion would be countenanced by the mode in which the mothers of his new acquaintance carried their little ones about with them, even as his own women bore their infants in a bag upon their shoulders.

Some reason—and trifles light as air to us were solid grounds to the primitive mind—some reason there certainly was for the verbal expression of relationship between man and the kangaroo that I have endeavoured to point out, and none has suggested itself to my mind except the good offices of the animal, its quasi-human attitude, and the maternal treatment of the young. Yet, after all, the true reason of the peculiar respect shown it may have been quite different and from the oblivion of ages irrecoverable.

The Aboriginal Rock Pictures of Australia.

[With Plates ii and iii.]

By R. H. Mathews, Licensed Surveyor.

(Read before the Royal Geographical Society of Australasia, Brisbane, December 14, 1894.)

Rude pictorial representations found on the walls of caves and on the smooth surfaces of rocks in various parts of Australia show that the aboriginal inhabitants were not altogether without appreciation of the beauties of art. Drawings more or less artistic and elaborate have been found in a number of places throughout Australia. When the opportunities afforded for study are so numerous, it is somewhat remarkable that so little is generally known of these rock pictures. Residents of districts in which they occur take but little notice of them; they see the rude sketches, but seldom realize that these same rough outlines—painted in pipe-clay, in red ochre, or in charcoal; or carved upon the surface of the rock—are of high and enduring interest to the student of ethnology. I hope that it is only necessary to point out the value of these specimens of native art for scientific purposes to awaken an interest in them among people who would otherwise pass them by without notice.

Few men have been found competent to avail themselves of their opportunities, consequently very little work has yet been done in this branch of anthropology. There is still a very large area of ground to be broken, and this work should be undertaken at once, while there is yet opportunity, or it will prove either incomplete, or too late altogether.

The rock pictures of the aborigines must be classed under two distinct heads—paintings and carvings. In the former the pictures are painted on the walls or roofs of rock-shelters in various colours; in the latter, the drawings are in the nature of outline engravings or carvings cut into the surface of the rock. In order to make the details more thoroughly understood, I will deal with the subject under the two divisions—*Rock Paintings*

and *Rock Carvings.* The paintings and the method of producing them will be first described; and afterwards the carvings will be similarly dealt with. A very brief reference to the first discovery of these drawings will be given under each head.

Rock Paintings.—The first authentic account of the discovery of rock paintings in any part of Australia, so far as I am at present aware, is contained in Flinders' *Voyages to Terra Australis*, vol. ii., pp. 188-189. On the walls of a cave at Chasm Island, on the western side of the Gulf of Carpentaria, Flinders states that on the 14th January, 1803, he "found rude drawings made with charcoal, and something like red paint, upon the white ground of the rock. These drawings represented porpoises, turtles, kangaroos, and the human hand. Westall, who went afterwards to see them, found the representation of a kangaroo with a file of thirty-two persons following after it. The third person of the band was twice the height of the others, and held in his hand something resembling the waddy, or wooden sword, of the natives of Port Jackson."

In P. P. King's *Intertropical Coasts of Australia*, vol. ii., pp. 26-27, he states that at Clack's Island, in Prince Charlotte Bay, on the eastern side of York Peninsula, Queensland, paintings were discovered on the 23rd June, 1821, by Cunningham who accompanied the expedition. "They were executed upon a ground of red ochre, rubbed on the black schistus forming the cave walls, and were delineated by dots of a white argillaceous earth which had been worked up into a paste. They represented tolerable figures of sharks, porpoises, turtles, lizards, trepang, starfish, clubs, canoes, water-gourds, and some quadrupeds which were probably intended to represent kangaroos and dogs." More than 150 figures had been thus executed on the walls and roof of the rock-shelter.

Captain (now Sir) George Grey, in his work *Two Expeditions of Discovery in N.W. and W. Australia*, 1837-39, published in 1841, vol. i., pp. 201-218, describes some paintings of men, kangaroos, fish, turtles, human hands, &c., executed in various colours, in caves or rock-shelters, which he saw on the Upper Glenelg River in March, 1838, in what is now the Kimberley District of Western Australia. In one of the caves

there could not have been less than from 50 to 60 drawings, but the majority of them were carelessly and badly executed.

P. Chauncy, in R. B. Smyth's *Aborigines of Victoria*, vol. ii., p. 222, states that in 1849 he visited a cavern in the face of a granite cliff overhanging the valley of the Avon River, about 10 miles south from the town of York, in Western Australia. In this cave were a number of red imprints of hands, and just over the mouth of the cave was a circular figure, drawn with the same red substance, about 15 inches in diameter, and filled in with lines and crossbars.

G. F. Moore, in his *Descriptive Vocabulary of the Languages of the Aborigines of Western Australia, &c.*, published in 1842, thus refers to the same cave : "The only vestige of antiquity or art which has yet been discovered consists of a circular figure, rudely cut or carved into the face of a rock, in a cavern near York, with several impressions of open hands found on the stone around it."

Chauncy speaks of the circle as a painting, whilst Moore says it was "cut or carved;" but the context of their descriptions shows beyond any doubt that they were describing the same cave. From the greater clearness of Chauncy's description, I am inclined to accept his account of it.

A. C. Gregory, in *Journals of Australian Exploration*, p. 147, under date 14th April, 1856, states : "A short distance below our camp we saw several native paintings on the sandstone rocks ; they consisted of rude outlines of fish and snakes, some in red ochre and others in white clay. Mr. T. Baines sketched some of the most remarkable." This was in latitude 16deg. 55min. S., near Roe's Downs, between the Wickham and Victoria rivers, Northern Territory, South Australia.

From the last date mentioned in the above extracts down to the present time, various writers have directed attention to rock paintings at different places in all the Australian colonies, but as the limits of this paper will not permit me to enumerate these further discoveries, I will now proceed to describe in detail how the paintings are produced.

Aboriginal paintings are executed in three different ways, which I shall call, for the purpose of my description :—(1) The

stencil method; (2) The *impression* method; and (3) The *outline* method or ordinary drawing. (1) In *stencilling* figures of the human hand or other objects on the walls and roofs of caves or rock-shelters, a smooth surface was selected and slightly damped with water, or moistened with animal fat. The palm of the hand was then placed firmly on the surface of the rock with the fingers and thumb spread out, and the required colour in a dry state blown over it out of the mouth. On removing the hand the space it occupied remains clean, whilst the surface of the rock around its margin is smeared with the colour used by the operator, contrasting strongly with the clean figure of the hand, and giving it the appearance of standing out in relief. I got this information from a resident of Wollombi, New South Wales, who, when a boy, about the year 1843, saw the blacks of that locality stencilling their hands on the walls of a rock-shelter or cave. For the white colours they used pipe-clay, and for the red, red oxide of iron, commonly called red ochre. Both Mr. E. Giles and Mr. Winnecke, in their accounts of their explorations in Central Australia, in 1873 and 1879 respectively, state that they saw hands stencilled upon rocks with powdered charcoal, which was applied in the same way that I have described. I have seen hands and other objects stencilled in white, red, or yellow, but black colour does not appear to have been used for stencilling among the natives of the districts visited by me. Previously damping or greasing the rock causes the dry powder of whatever colour to firmly adhere to, and penetrate the surface, where it appears to have the durability of an ordinary pigment.

This method of drawing was also adopted in many instances in representing implements of the chase, such as boomerangs, tomahawks, waddies, &c. (See Figs. 3 and 4, Plate II.) In several instances, the hand with part of the arm attached as far as the elbow, and in some cases even farther, is represented in this method. I have also seen figures of fish, and at one place several footmarks of dogs and kangaroos, stencilled on the rock in the same way. In some of the stencilled paintings of native weapons which I have seen, the colouring matter around the margin of the object had the appearance of having been applied to the rock in a wet or pasty state with

some kind of mop or brush. I have no doubt that in some instances the colour was applied either in this way, or was blown in a moist state out of the mouth.

Although it is probable that in many of the stencilled pictures of hands, the hand was held in position on the rock and the colour applied by the same operator, an inspection of Plate II will show conclusively that two or more persons must have participated in drawing some of the objects. For instance, the foot shown in Fig. 7 must have been held on the rock by one person while another applied the colour. Boomerangs, tomahawks, and sticks—some of the latter being about 4ft. long—would require at least two persons to join in the work.

(2) In the *impression* method, the colour to be used was mixed with water, or with bird or fish oil, in some kind of native vessel, into which the palm of the hand was lightly dipped, and then pressed firmly against the surface of the rock, and on its removal the coloured imprint was left clearly defined. All the hands in Fig. 6, and three of those in Fig. 4, are done in this way. I have never seen or heard of any figures except the hand having been executed in this method, and the only colours I have observed are red and white. R. B. Smyth, in his *Aborigines of Victoria*, vol. i., p. 291, states that he was informed by Mr. Brown that the natives of Western Australia made these impressions by blackening their hands, and then pressing them against the rock. The black colour would no doubt be obtained by mixing powdered charcoal or soot with oil or grease.

E. M. Curr, in his work, *The Australian Race*, published in 1886, vol. ii., p. 301, in speaking of the tribes on the Leichhardt River, Queensland, says: "To mark a clean surface with a dirty, greasy, or painted hand is a common practice of our blacks, and I have seen them do it in several places long distances apart." And again, in vol iii., p. 679, he says: "I have often myself seen the blacks imprint their hands, stained with red ochre, on suitable surfaces, and cannot accept such marks as a proof of antiquity."

Mr. W. W. Froggatt informs me that he saw impressed hands in caves at Mount Anderson, near the Fitzroy River, Western Australia—showing the wide distribution of this mode of drawing.

In the districts visited by me in New South Wales, in collecting information on the subject of this paper, I have found *impressed* hands in comparatively few caves, the *stencil* method being that generally adopted; and in both these methods of drawing it was the palm and never the back of the hand which was used.

(3) Native pictures of men, animals, and other objects to which neither of the preceding methods would be applicable are drawn in *outline* in various colours. In some cases the objects depicted were merely outlined, as the iguana and lizards in Fig. 1; in other instances, as in Fig. 7, they were shown in solid colour all over; whilst in others, as in Figs. 2 and 5, the space within the margin of the outlines was shaded by strokes of the same colour or a different one. In these cases the colours used are mixed with bird or fish oil, or the fat of some other animal; pipe-clay and red ochre being used for white and red respectively; and when a black colour was required it was made from ground charcoal or soot similarly mixed with grease. Mixing the colours with an oily or fatty substance caused them to penetrate the surface of the rock and become very durable. Perhaps the colour was applied to the rock by means of a kind of brush, made of the bast bark of some tree, or of tough grass. Judging by the appearance of the lines in several of the figures drawn in this method, I think it not unlikely that in most cases, before commencing the drawing, the surface of the rock was damped with water or slightly moistened with grease, and that then a piece of the required colour—as a lump of red ochre, or pipe-clay, or charcoal—was held in the hand of the operator, and the necessary lines drawn with it upon the rock.

Besides the colours mentioned, vegetable colours were also known to the aborigines. E. Stephens says, "The natives painted red bands on their shields by means of the juice of a small tuber which grew in abundance in the bush."—*Journal Royal Society, N.S.W.*, vol. xxiii., p. 487.

I have visited a very large number of caves containing native paintings, and only in a few of them have I found yellow colour employed, and then only for a few small figures, yellow clays not being plentiful. Blue colour is still scarcer, and I have only observed its use in one cave.

Rock Carvings.—The earliest reference I can find to these carvings upon rocks is that contained in *A Narrative of the Expedition to Botany Bay*, by Captain Watkin Tench, published in 1789. At p. 79 of the third edition of that work, in speaking of the country around Botany Bay, he says, "On many of the rocks are to be found delineations of the figures of men and birds very poorly cut."

In John White's *Journal of a Voyage to New South Wales*, published in 1790, at p. 141, he states that on the 16th of April, 1788, on a tributary of Port Jackson, he found "various figures cut on the smooth surface of large stones. They consisted chiefly of representations of the natives in different attitudes; of their canoes; of several sorts of fish and animals, and considering the rudeness of the instruments with which the figures must have been executed, they seemed to exhibit tolerably strong likenesses."

In *The Voyage of Governor Phillip to Botany Bay*, published in 1790, 2nd edition, pp. 89-90, under date the 22nd of April, 1788, it is stated that "In all the excursions of Governor Phillip, and in the neighbourhood of Botany Bay and Port Jackson, the figures of animals, of shields, and weapons, and even of men, have been found carved upon the rocks. . . . Fish were often represented, and in one place the form of a large lizard was sketched out with tolerable accuracy. On top of one of the hills the figure of a man, in the attitude usually assumed by them when they begin to dance, was executed in a still superior style."

In Mr. Collins' *Account of the English Colony of New South Wales*, published in 1798, vol. i., p. 593, in speaking of the aborigines in the district of Sydney, he says, "On the rocks I have seen various figures of fish, clubs, swords, animals, and even branches of trees, not contemptibly represented."

Capt. Grey, in his *Two Expeditions of Discovery in N.W. and W. Australia*, vol. i., pp. 205-6, when exploring in 1837-1839, in the Kimberley District of Western Australia, near where he discovered the paintings referred to at p. 47 of this paper, "observed a profile of a human face and head cut out in a sandstone rock which fronted a cave; this rock was so hard that to have

removed such a large portion of it with no better tool than a knife and hatchet made of stone, such as the Australian natives generally possess, would have been a work of very great labour. The head was 2ft. in length, and 16in. in breadth at the broadest part; the depth of the profile increased gradually from the edges where it was nothing to the centre where it was an inch and a half; the ear was rather badly placed, but otherwise the whole of the work was good, and far superior to what a savage race could be supposed capable of executing."

Capt. Wickham, in "Notes on Depuch Island," published in the *Journal of the Royal Geographical Society*, London, in 1842, vol. xii., pp. 79-83, thus refers to some aboriginal carvings which he saw there in 1840. "Depuch Island, latitude 20deg. 38min. S., longitude 117deg. 44min. E., is one of a string of small islands called the Forestier Group, lying from one to three miles off the coast of Western Australia. The island is connected with the mainland by ridges of sand, which in many places become quite dry at low water, and afford facilities to the natives for reaching the island for the purpose of procuring turtle and fish, as well as for the exercise of their talent for drawing on the smooth surface of the rocks.

"From the vast number of specimens of art the natives seemed to have amused themselves in this way from time immemorial; and from the very hard nature of the stone, and the accuracy with which many animals and birds are represented, they deserve great credit for patient perseverance, and for more talent and observation than is usually bestowed on the natives of New Holland.

"The method pursued in tracing the different objects appears to be by cutting the surface of the rock with sharp pointed pieces of the same stone; and as the exterior of all parts of it is of a dark reddish brown colour, the contrast becomes great when that is removed, and the natural colour of the greenstone exposed. It is difficult to conjecture what many of their drawings are intended to represent, but others are too well done to admit of a moment's doubt. Probably many of the inferior performances were the work of the children.

"In some of the drawings the surface of the stone was entirely cut away; others were only in outline."*

Capt. Wickham forwarded to the Royal Geographical Society 92 specimens of drawing, describing the various objects represented, but only 13 of these were reproduced by lithography, and are given in a Plate in the Society's Journal.

Capt. J. L. Stokes, in his *Discoveries in Australia*, published in 1846, vol. ii., pp. 168-172, also describes these carvings, but not so fully as Capt. Wickham.

In *Waugh's Australian Almanac*, for 1858, at pp. 58 and 59, George French Angas thus describes some of the rock carvings near Sydney:—"The objects represented are the human subject in the attitude of dancing; the hielaman, or shield; kangaroos, birds, flying squirrels, and various kinds of fish intended no doubt for sharks and whales, some of which latter are 27ft. in length. The natives say that the blackfellows made them a long time ago. They agree in stating that the natives did not reside on these spots, assigning as a reason they were frequented by evil spirits. They also state that these places where the carvings exist were all sacred to the doctors and conjurers, and were in fact 'Koradjee' or priests' ground. As the whole of these carvings represent indigenous objects, and above all the human figures in the attitude of the corroboree dances, no other conclusion can be drawn than that they are of native origin."

Having given these extracts from the fragmentary accounts scattered through the works of early Australian historians and others, during the first seventy years of the history of the continent, I will now endeavour to explain how these carvings were executed.

Two methods appear to have been employed by the aborigines in producing rock carvings. (1) That most generally adopted was to cut the required figure on the surface of the rock with some sharp-pointed instrument. (2) The other method was to trace on the rock the object to be drawn, and then to grind it

* These carvings have frequently been referred to as "paintings." In Smyth's *Aborigines of Victoria*, I., p. 292, he says, "On Depuch Island Stokes discovered a large number of paintings." Rev. J. Mathew, in the *Journal of the Anthropological Institute of Great Britain*, xxiii., p. 42, says, "The paintings on Depuch Island are numerous."

out by repeated rubbing with a piece of hard stone or pebble along the outline which had been traced.

(1) In visiting groups of native carvings, in different localities around Sydney and other districts, I came upon some figures which had been partially carried out and then abandoned, which disclosed the manner in which the work was done. A number of holes were first made close together along the outline of the figure to be drawn, and these were afterwards connected by cutting out the intervening spaces, thus making a continuous groove of the required depth and width. In some of the best executed figures, I have found these grooves about half-an-inch deep, and about an inch and a quarter wide, but in a few instances I have seen them two inches wide, and an inch and a half deep. In many of the more inferior carvings, the depth and width are much less. It is probable that the object was first outlined by drawing a piece of coloured stone or hard pebble along the line to be cut out. Judging by the punctured indentations made in the rock in cutting out the lines of these figures, I conclude that the natives had a hard stone or pebble chipped or ground to a point and used as a chisel. As soon as the outline of the figure was chiselled out to the required depth, I think a stone tomahawk in addition to the chisel was used in completing the work. I am led to this opinion because the sides of the grooves are cut more evenly than could have been done with such an instrument as the holes were punctured with ; and there is no doubt the work could be done in this manner with greater expedition. From the smoothness of the edges of the grooves in a few of the best executed figures, I am inclined to believe that after the chiselling and chopping-out was finished, the edges were ground down by rubbing a stone along them. In support of these conclusions, I may state that close to Fig. 12, Plate III, I found a number of hollows* in the surface of a large sandstone rock which had been used by the aborigines for grinding their stone weapons. I saw similar grinding places on a rock close to Fig. 10. The carvings of men and other objects are generally found on horizontal surfaces, but are sometimes met with on the smooth walls of rocks

* For full descriptions and drawings of similar native grinding places see my paper on "Some Stone Implements used by the Aborigines of N. S. Wales," published in the *Journal of the Royal Society of N.S.W.*, vol. xxviii., pp. 301-305, Plate xliii., Fig. 3.

occupying various slopes between the horizontal and the perpendicular position, as in Fig. 11, Plate III. In some cases the rock surface on which these carvings are delineated is not more than 10 or 20ft. square ; in other places, where there are groups of carvings, the area of the surface of the mass of rock varies from a quarter to half an acre in extent, and even more.

In some of the Depuch Island carvings the whole surface of the rock within the figure was cut away, whilst others were only in outline. The depth of the cutting is not given in either instance, but it probably did not exceed about half an inch, the object being merely to expose the unweathered surface of the rock. Capt. Wickham, who examined the figures carefully and made drawings and descriptions of 92 of them in different places, appears to have found sufficient evidence to enable him to arrive at the conclusion that they were cut out "with sharp-pointed pieces of the same stone."

(2) In the Murchison district of Western Australia, Mr. E. Favenc informs me that he found outlines of the human foot and other marks scratched upon the surface of granite rocks. These outlines had apparently been worn into the surface of the stone by repeated rubbing with a hard pebble held in the hand of the operator. The drawings were not deep, but would probably last a long time owing to the hardness and durability of the granite rocks on which they appeared.

Age and Meaning.—From the facts stated in this paper it appears that rock painting was practised for a long time after the white people first settled in Australia. I have collected evidence that the blacks in the Wollombi district of New South Wales executed paintings in caves up till 1843 at any rate, and it is likely that the practice was continued by them to a much later date. The instances recorded by Mr. Curr are still more recent, and would perhaps reach as late as about 1870 or 1880. As regards the rock carvings, although I am not aware of any instance where the blacks have been seen by Europeans cutting these figures upon rocks, there does not seem to be any reason for assigning to them a remote date of execution. Some of those which are the best preserved have probably been done after the first occupation of the country by the white race, who, it is

well known, took little or no notice of the customs of the aborigines of that period.

In several of the carvings which I have found upon rocks, only parts of the figures could with difficulty be traced out; in others the outline was faintly distinguishable; whilst others were well defined and easily seen. The same remarks will apply to the paintings. In the numerous caves visited by me some contained paintings which were quite distinct; whilst in others the figures were in various stages of decay—some being barely discernible—owing to the wasting away of the rock, and in a few instances I was told by old bushmen that in caves which they once knew to contain paintings nothing is now visible. Even in the same cave I have observed a great difference in the apparent age of the paintings; and on the same rock I have noticed carvings which appeared to be much older than others; in either case showing that the work had been executed at different times during a considerable period.

There is much difference in the quality and style of the carving in these figures, even when they are of the same size. Some grooves are deep and wide and are well finished, whilst others are narrow and the depth slight. We find this difference in the same locality, and sometimes on the same mass of rock, although the age of the carving and the quality of the stone are apparently about the same. This may be owing to the drawing having been done by different members of the tribe, some of whom would be more dexterous at this work than others; or the groovings of lighter or rougher character may have been executed by the women or youths.

The Hawkesbury Sandstone on which these pictures are drawn is not very durable, even under the most favourable circumstances. It will, however, last a considerable time if kept dry, but when located in damp situations it crumbles away rapidly. Some sandstones are much finer and harder than others, which would considerably add to the durability of both paintings and carvings executed upon them.

I have found that caves which face the sun are in the best state of preservation. Of the eight caves described in this paper they all face the sun for a greater or lesser period during every

day, with the exception of Fig. 5, which faces the south, and is therefore out of the sun's reach. It is noteworthy that the rock in this cave is fretting away in many places.

Various conjectures have been made as to the meaning of these drawings, some of which are rather wild and far-fetched. In the present paper I shall abstain from all theorising, which at this stage of the inquiry would necessarily be premature. I may, however, suggest that perhaps some of these pictures are idiographic expressions of events in the history of the tribe; certain groupings of figures may pourtray some well-known legend; many of the animals probably represent totems; some of the drawings were, perhaps, as Mr. Angas states, sacred to the Koradjee or conjurors; but it is likely that a large number of them were executed for pastime and amusement. Thorough and systematic collection of data respecting this part of the subject can alone give a reliable groundwork for generalisations.

Geographical Distribution.—Aboriginal paintings of men and animals, and various other devices, upon the walls and roofs of caves have been observed in Western Australia at various places far apart; they are found in several localities throughout South Australia from the southern counties to the Gulf of Carpentaria and Port Darwin. They are widely distributed along the rivers and ranges of New South Wales; and in Queensland they are scattered both along the coast and in the interior, from Cape York to the southern limits of the colony. In Victoria they are not so numerous, but I am told that there are some paintings on the western side of the Victoria Range, county of Dundas, and also on the north-eastern side of the Grampians in the county of Borung.

The rock paintings of Australia are almost everywhere of a somewhat similar character, with but little variation either in the subjects treated or in the style of workmanship. The stencilled and impressed hands, the outlines of men and animals rudely drawn in various colours, appear to be universally distributed over the continent. In a letter received from one of the members of the Horn Expedition to the McDonnell Ranges, I am told that the rock paintings they met with consisted chiefly of lines and nondescript devices resembling geometrical figures;

and the few drawings of men and animals which were observed were of the usual rough character. I understand that the scientific results of the expedition will be published in an independent volume. From a similar source I learn that an unpublished anthropological report of the Elder Expedition is largely occupied with native drawings, found in several places during the expedition, and which are also of a rudimentary character. When the two reports referred to are published, they will no doubt prove a valuable addition to the scanty literature bearing upon aboriginal drawings.

Mr. C. Winnecke, the leader of the recent Horn Expedition, informs me that he saw native paintings on the walls of caves in granite rocks, as well as in sandstone, when exploring in the Northern Territory in 1879. According to R. B. Smyth in his *Aborigines of Victoria*, vol. i., p. 291, H. Y. L. Brown saw some paintings in caves in granite rocks in Western Australia. Mr. W. W. Froggatt told me that, when at the Oscar Ranges, in the Kimberley district of Western Australia, he saw a large number of aboriginal paintings on the walls of limestone caves. I have also been informed by owners of runs on the head-waters of the Flinders River and its tributaries, Queensland, paintings have been seen in limestone rock-shelters. I have drawn attention to these statements, because all the drawings described in this paper are on sandstone rocks. It will be readily understood that the rock formation is of no consequence to the natives, whose choice is determined by a smooth surface in a convenient and sheltered locality. These remarks are also applicable to carvings, which have been found on granite and other hard rocks, where sandstone is not available.

Aboriginal carvings upon the smooth surfaces of rocks have also been observed in a few parts of the Australian continent widely separated from each other. In previous pages of this paper, I have mentioned the localities in which they have been seen in Western Australia. In South Australia, Mr. H. Y. L. Brown, the Government Geologist for that colony, states that at Blanchewater, on Taylor's Creek, a tributary of Lake Blanche, he saw representations of human footmarks, and also those of kangaroos, cut on the surface of rocks by some sharp instrument. At Paratoo and Oulnina he saw footmarks of kangaroos cut on

the rock in a similar manner. As far as I have been able to learn, none of these rock-carvings have hitherto been observed in any part of Victoria, and ought therefore to be searched for in likely localities in that colony.

A correspondent informs me that in 1883, he saw a number of rock carvings on the head of the Batavia River, York Peninsula, Queensland. The figures consisted of men, women, kangaroos, ducks, emus, &c., and were cut about half an inch deep into the surface of some flat sandstone rocks on the side of a hill, about 150 yards from the river. The place where he saw these carvings is about 70 miles up the river from where it empties into the Gulf of Carpentaria.

Up to the present time I have not succeeded in hearing of any other carvings in Queensland, but I am of opinion that they will be found along the coast, and perhaps in likely parts of the interior. As a general rule, the coastal districts are the most fertile and best watered parts of the colony, abounding in edible plants, fish, and game of all sorts. It has been observed that the development of any people has a connection with improved physical surroundings. With a plentiful food supply and permanent water, the natives would have more leisure for the exercise of their faculties of imitation and invention. For these reasons I am disposed to think that aboriginal carvings, similar in character to those described in this paper, will be found along the eastern coast of Queensland and in the Gulf of Carpentaria. I hope, therefore, that some of the readers of this paper will have the opportunity, or will make the opportunity, of searching for these carvings in localities where large smooth masses of sandstone or other rocks are found along the coast, or along the valleys of rivers flowing into it. I mention the coast districts as being the most likely to reward the labours of the investigator, but these enquiries should be continued throughout the colony.

The rock carvings of Australia are not so well-known as the paintings, and, as far as our present knowledge extends, they are not so widely distributed. From the facts recorded in this paper, it appears that the natives of the coast of Western Australia in the neighbourhood of Depuch Island, and those of the eastern coast of New South Wales, had the same, or at any rate

an analagous, method of producing these carvings, and in both colonies the objects depicted are numerous and varied. It will also be observed that, in several instances, the same kind of animals have been selected for illustration. These are points of very great interest and value to the ethnologist.

DESCRIPTIONS OF THE PLATES.

Paintings and carvings executed by the aborigines have been observed ever since the time of the first settlement of Australia down to the present; but until now no systematic attempt has been made to copy and describe them in detail, and fix their position on the public maps.

All the paintings and carvings shown on the Plates attached to this paper are drawn to scale from careful sketches and measurements taken by me in every instance. With the exception of Figs. 5 and 7, on Plate II, all the paintings are shown in their relative positions, just as they appear on the walls of the caves. The direction which each cave or rock-shelter faces has been taken with a pocket compass, as this information may be found valuable for comparison or for other purposes. Owing to the distance of the carved figures from each other, it would have taken up too much space to have shown them in their relative positions; they are, therefore, fitted on the Plate in convenient spaces.

The position of each painting and carving on the Government maps is stated in the descriptions, so that they can easily be found by anyone wishing to examine them. As all the paintings and carvings referred to in this paper are situated within New South Wales, it will not be necessary to repeat the name of the colony in the description of each figure. Any other information which would assist in readily identifying the locality has been added in all cases.

It may be as well to state for the information of other investigators that photography is not practically applicable to obtaining copies of the pictures drawn in caves or carved upon rocks. The paintings are often found in crescent-shaped hollows in the walls of caves; they are also frequently seen on the roofs, which are sometimes dome-shaped and nearly always irregular. The distortion due to perspective would therefore be considerable in

the circumstances stated. The indistinctness of many of the paintings, and the want of proper light, would be insuperable obstacles. The difficulties attending the taking of photographs of carvings on horizontal rocks are quite as great as in the case of the paintings. Moreover, some of these carvings are of gigantic size, and the outlines of many of them are barely distinguishable to a practised observer, but would not appear at all in a photograph. A few well-defined small objects could perhaps be photographed, but for work of this kind in the field the camera is practically valueless. The mode of drawing from measurements showing the position of every object, in its proper colour, and drawn to scale, is the only way in which this work can be done to be of any value for scientific purposes.

PLATE II.—PAINTINGS.

Fig. **1**.—The paintings shown in this Fig. consist of four hands stencilled in red, right and left being equally represented; two snakes drawn in red, each being about 6½ft. long; three lizards, and part of an iguana, the other part of the latter being supposed to have disappeared into a crack in the rock. The head of one of the snakes is hidden in a crack in a similar manner. The remainder of the figures comprise two six-legged objects and four lines all drawn in red. All the drawings in this cave are on the roof, except the three lizards and iguana which are on the back wall near the angle of the roof. I think that in executing the drawings on the roof, the native artists must have stood upon some large stones or logs of wood brought there for the purpose. Some of the drawings are about 8ft. from the floor, the level of which does not appear to have been altered by weathering.

This cave is in an escarpment of Hawkesbury Sandstone, about three-quarters of a mile southerly from Portion No. 4 of 40 acres, in the parish of Wilpinjong, county of Phillip. Its length is 79ft., depth 25ft. from the front inwards, and its height at the back 6ft. 6in., gradually increasing outwards towards the front. The cave faces north-east, and contains several other paintings,* those shown in the Fig. being some of

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* Nearly all the remaining paintings in this cave are described in my paper on "Aboriginal Rock Paintings and Carvings in N.S.W.," published in the *Proc. Roy. Soc. Vic.*, vii., n.s, pp. 150-151, Plate viii., Fig. 5.

the most interesting. About a chain in a north-westerly direction from this cave is another, containing 39 impressed hands, some of which are described in another part of this paper and are illustrated in Fig. 6, Plate II.

Fig. 2.—The rock shelter in which these drawings appear is about 8 chains westerly from the western boundary of Portion No. 42, of 120 acres, in the parish of Tollagong, county of Hunter, and faces S. 50 deg. E. Its length is 44ft., depth inwards 23ft., and its height varies from 5ft. to 8ft., owing to the irregularities of the roof.

There are several groups of drawings on the cave walls which are of Hawkesbury Sandstone, but the one I have selected is the best, and is, moreover, one of the most interesting I have yet met with on account of its containing pictures of women which are by no means common in these aboriginal paintings. On the left of the spectator on entering is a right hand, stencilled in red, the only hand of that colour in this cave, and has probably some special significance. Then come the figures of a man and woman, in white outline, shaded with black, the man having a few lines of white and red among the shading. In the right hand corner are another man and woman, not so large as the others, nor so well drawn—the females being much the smaller in each instance. In the intervening space is an eel, a bird, some nondescript objects, all in black, and two human hands executed in white stencil.

Fig. 3.—The cave in which these paintings are found is 8ft. long, 7ft. deep, and 6ft. high, and faces the north. It is in a sandstone rock on Portion No. 13, of 30 acres, parish of Macdonald, county of Hunter. The paintings consist of eight left hands, one of which has the third and fourth finger missing. The objects of greatest interest in this cave are the representations of two tomahawks, one with a handle and one without, similar to those made and used by the Europeans for many years after New South Wales was first settled. The shape of the blade in each of these, and the form of the handle, leaves no doubt in my mind that they represent tomahawks obtained by the natives from the white people, either as gifts or by plunder, showing that these drawings were made since the district was first occu-

pied by Europeans. I take the other oblong-shaped object to be the head of one of the native stone hatchets which I have in other caves seen depicted without the handle. Every object in this cave is stencilled in white on the back wall which is much begrimed with smoke.

Fig. 4.—This rock shelter is in a high rocky escarpment of Hawkesbury Sandstone, about 10 or 12 chains southerly from the south-west corner of Portion No. 1, of 30$\frac{3}{4}$ acres, in the parish of Murrumbo, county of Phillip. It is 40ft. long, 25ft. high, and 26ft. deep from the front inwards, and faces the north. There are 27 stencilled hands, one of them being shut, and another having the middle finger off, besides three hands done in white by the impression method. The cave also contains five native tomahawks with handles, two boomerangs, and three waddies, all stencilled in white colour. There is also an object which I cannot identify, drawn in white, about 1ft. long.

Fig. 5.—This cave or rock-shelter is 34ft. long, 30ft. deep, and 8ft. high inside, but on account of the dome-shaped roof is only 5ft. high at the entrance. The drawings on the back wall consist of a kangaroo, 3ft. 10in. from the ears to the point of the tail; a human figure 1ft. 7in. high; two other human figures delineated as far as the waist; and four representations of what appear to be intended for eels. The smallest of these eels is 3ft. 2in. long, the others being 4ft. 5in., 4ft. 7in., and 4ft. 10in. respectively, and are interesting on account of the manner in which they are shaded, which is unusual. All the figures in this cave are drawn in black colour in the outline method. The cave is in an escarpment of Hawkesbury Sandstone, facing the south, and is situated near the western boundary of Portion No. 16, of 50 acres, parish of Macdonald, county of Hunter. This cave is rather damp, and the rock is fretting away in several places on the walls and roof. The objects in this Fig. are not shown in their relative positions, owing to their being too much scattered over the walls of the cave. They would occupy too much space on the Plate if so shown.

Fig. 6.—This cave is in the same escarpment of Hawkesbury Sandstone as Fig. 1, from which it is distant about a chain in a north-westerly direction. Its length is 54ft., depth 13ft. from

the front inwards, and its height 10ft., and it faces the north-east. The cave contains 39 impressed hands altogether, which are scattered along 32ft. 6in. of the back wall, but I have selected 25, which are close together, for illustration in this Plate. In New South Wales this method of drawing the hand is not common; perhaps impressed hands had some particular meaning. There are no other figures in this cave except the hands which are all in red colour. †

Fig. 7.—These drawings represent a man and a woman as far as the waist, a kangaroo, and the head and forelegs of what appears to be intended for a wombat. There is a human foot stencilled in white, all the other figures being in black. The cave or rock-shelter in which these paintings are found faces N. 35 deg. W., and is situated on Portion No. 10, of 60 acres, parish of St. Albans, county of Northumberland. In order to save space on the Plate, I have not shown the objects in this Fig. in their relative positions.

Fig. 8.—The cave containing these paintings is in an escarpment of Hawkesbury Sandstone about 8 chains from the right bank of Cox's Creek, and about 6 chains north of Portion No. 3, of 40 acres, parish of Dabee, county of Phillip. Its length is 56ft., depth 23ft., being 6ft. high at the back, the roof gradually rising until it is about 20ft. high at the front, and faces the south-east. There are 17 hands besides other objects drawn on the back wall of this cave, but I have selected for this Fig. the most interesting section.

The object on the left may be either a beetle or a turtle, and is not infrequently found among rock paintings. Then there are three left hands close together, stencilled in red, the fingers pointing upwards. A portion of the back wall of the cave has been painted red, and upon this red background are drawn in white four perpendicular lines about 7in. long, and four hands stencilled in white—the white stencilling contrasting strongly with the painted wall. This is the only case where I have found this mode of painting adopted; but a similar instance of white painting on a previously prepared red ground is mentioned by King in the extract given at p. 47 of this paper.

† For another good specimen of impressed hands see Fig. 2. Plate viii., of my paper on "Aboriginal Rock Paintings and Carvings in N.S.W.," published in *Proc. Roy. Soc. Vic.*, vol. vii., n.s., p. 149.

In my descriptions of Figs. 1, 2, 6, and 8, I have stated that there are other paintings in the caves in which they appear. The remainder of these drawings, or perhaps the whole of them, will be included in a paper by me on the "Aboriginal Rock Carvings and Paintings of New South Wales," which will be published in the Journal of that Society for 1895, vol. xxix.

PLATE III.—CARVINGS.

Fig. 1.—This gigantic figure of a man is carved on a flat rock of Hawkesbury Sandstone, on the top of a spur about half-a-mile north-westerly from Cooper Trigonometrical Station, parish of Frederick, county of Cumberland. The height from the left foot to the top of the head is 15ft. 2in., and the width across the body 4ft. 6in. There is a belt around the waist and bands round the arms and thighs; there is also a necklace from which depend what resemble two strings of beads or shells. The necklace and the bands around the thighs are rather uncommon. Four ray-like lines, the longest of which is 13in., rise from the head, which are probably intended for ornaments stuck in the hair. The eyes are shown, but the nose and mouth have been omitted. The projections on each side of the head are intended either for ornaments attached to the ears, or for the hair of the individual. The mass of rock on which this figure is found is about half-an-acre in extent, and has a gentle dip towards the east.

Fig. 2.—This well executed representation of an emu* is carved upon a large flat rock on top of a hill about half a mile northerly from the north-west corner of Portion No. 6, of 50 acres, parish of Wonga, county of Hunter. It is 6ft. 3in. from the top of the head to the end of the toe. Only one leg is shown, and the foot is a straight continuation of the leg, a mode of drawing I have observed in other native figures of emus. The rock slopes northerly.

Fig. 3.—This is another carving of an emu, measuring 9½ft. from the bill to the tail. There is a band around the neck and another around the leg. It is situated on a southern continuation of the same rock as that on which Fig. 1 appears.

* An emu is mentioned by Capt. Wickham as having been observed by him among the Depuch Island carvings.—*Journ. Roy. Geog. Soc.*, xii., p. 83.

Within the outline of the body of the emu is the representation of a shield † with a longitudinal and a transverse bar cut upon it. Whether this shield was intended to convey any legendary meaning in connection with the emu, or whether it was drawn there before or after the completion of that bird, on account of the suitability of the rock surface, it is impossible to determine.

Fig. 4.—This carving of a female kangaroo is on the same rock as Fig. 1, and measures 10ft. 7in. from the nose to the tip of the tail. The eye is shown, and there is a band across the shoulder and another across the tail.

Figs. 5 and 6.—These are two fairly good representations of the male kangaroo,‡ and are cut upon a large flat rock of Hawkesbury Sandstone on top of the ridge dividing the waters of the Macdonald River and Webb's Creek, and are about a quarter of a mile north-westerly from Fig. 2. Fig. 5 measures 11ft. 1in., and Fig. 6 10ft. 11in. from the nose to the end of the tail. The rock on which they are delineated slopes towards the south. The numerous lines, which are cut in the rock in the usual manner, appearing on the body of Fig. 6, are rather uncommon, and make this figure interesting.

Fig. 7.—From the general form of the body, I think there can be no doubt that this is intended to represent the opossum; it is on the same rock as Figs. 5 and 6, and has a line across the neck. From the nose to the tip of the tail is 4ft. 6in.

On the rock which contains Figs. 5, 6, and 7, are about twenty representations of emus' tracks, cut into the surface of the rock like the other objects. Fourteen of these tracks, a little larger than an emu's foot, occur in a space of 13ft. 4in. in a nearly straight line, and are all going in the same direction.

Fig. 8.—This representation of a fish,§ 9ft. 2in. long, is carved upon a flat sandstone rock on Portion No. 1139, of 24½ acres, parish of Manly Cove, county of Cumberland. Two fins are shown, and there are five lines or bands across the body which are unusual. The rock has a gentle slope towards the north-east which keeps it very dry.

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† Capt. Wickham mentions a shield among the carvings seen by him on Depuch Island.—*Journ. Roy. Geog. Soc.*, xii., p. 82.
‡ Capt. Wickham says he saw representatives of the kangaroo among the carvings on Depuch Island.—*Journ. Roy. Geog. Soc.*, xii., p. 83.
§ Sharks and fish are mentioned by Capt. Wickham, *loc. cit.* p. 83.

Fig. 9.—This group of carvings is on a flat sandstone rock, slightly elevated above the surface of the surrounding land, on the western side of the track from Pymble to Cowan Creek, about half-a-mile southerly from Bobbin Trigonometrical Station. A man a little over 5½ft. high if the legs were straight, and a woman 3½ft. high, are represented in the attitude assumed by the natives in dancing a corroboree. The eyes and mouth are delineated, but the nose is missing in both. Each has a belt around the waist, and the man has a band around the arms near the shoulder, like Fig. 1. The male figure is very much the larger of the two, a disparity frequently found, but is not universal, in native drawings. Seventeen ray-like lines rise from the head of the man and eight from the head of the woman, which may be intended either for hair or for ornaments stuck in it. Close to the man and woman is a carving evidently intended to represent a native bag, the length of which is 2ft. 5in., and breadth 1ft. 9in. There is the usual string attached for the purpose of slinging it over the shoulder. The bag is delineated by seven longitudinal lines, with about twenty-six transverse lines crossing them, representing the basket-work. The remainder of the group consists of three large, rudely carved representations of human footmarks.

This is one of the most interesting native carvings with which I am at present acquainted, because it shows some of the positions of the natives in their dances. R. Sadlier, in his *Aborigines of Australia*, p. 19, says, "There are many kinds of corroborees. All have the song and the dance ; both are at times very libidinous, especially the dance of the women."

Fig. 10.—This carving represents a native, 5ft. 5in. high, holding up his hands, and having close to him a boomerang,* shield, tomahawk, and an object 10in. long which I am unable to identify. The space between the legs has been utilised to form the outline of a fish about 4ft. long. This is done by continuing the lines forming the inner side of each leg downwards for about 15in., and connecting them in such a manner as to indicate the tail of the fish. Two fins, one on each side, and an eye, were then added, as well as five dots which were probably intended to

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* The boomerang is also mentioned among the Depuch Island carvings.—*Loc. cit.*, p. 82.

represent the gills. This group is on the same rock as Figs. 8 and 16.

Fig. 11.—This figure of an iguana,[¶] 6ft. long and 1ft. across the body, is carved on the almost perpendicular face of a large block of sandstone, close to the south-western shore of Cowan Creek, a short distance above the junction of Cockle Creek. On the same rock are delineated two fish, six boomerangs, and two kangaroo rats,[**] which are not shown on the Plate owing to want of space. This rock is situated in the parish of Gordon, county of Cumberland.

Fig. 12.—This huge and well-executed representation of a man is carved on a large mass of Hawkesbury Sandstone, and is about a chain and three-quarters westerly from Taber Trigonometrical Station, parish of Broken Bay, county of Cumberland. The height of the figure is 9ft. 8in., and the width across the body is 3ft. 9in. There is a forehead band in which an ornament is stuck on each side of the head. Cf. Fig. 1. In the right hand is a club 2ft. 6in. long, with another weapon 2ft. long close beside it. Near the left hand is a shield [††] 3ft. 8in. long and 1ft. 8in. wide, with a longitudinal and a transverse bar carved upon it. The eyes, nose, and mouth are shown—the latter rather on one side. In the belt around the waist some object appears to be carried, and within the outline of the man is a subordinate carving which I am unable to identify. The right foot has six toes and the left only four; the right hand has five fingers, the left four.[¶†]

Fig. 13.—This figure is carved on the same large flat rock as Figs. 1 and 4, and is intended to represent an emu sitting on its nest containing ten eggs.[‡‡] The native artist does not appear to have been able to overcome the difficulty of showing the leg

¶ The representation of an iguana is mentioned by Capt. Wickham in his list of the carvings on Depuch Island.—*Journ. Roy. Geog. Soc.*, vol. xii., p. 82.

** A kangaroo rat is mentioned among the carvings on Depuch Island.—*Loc. cit.*, p. 83.

†† Capt. Wickham mentions a "native with spear and shield," and also a "native with womerah," among the carvings on Depuch Island.—*Loc. cit.*, p. 82.

¶† Figs. 9 and 12 of this Plate are described in a paper on the "Aboriginal Rock Paintings and Carvings in New South Wales," contributed by me to the Royal Society of Victoria, and published in their Proceedings, vol. vii. (n.s.), pp. 151-153, and are therein shown as Figs. 7 and 8, of Plate ix. I have again included them in the present paper, because they are among the best examples of native drawing with which I am acquainted, both as regards subject and design.

‡‡ Capt. Wickham, in his description of one of the carvings on Depuch Island, says it "is probably meant to represent the eggs of the emu as laid in the nest."—*Journ. Roy. Geog. Soc.*, vol. xii., p. 82.

bent under the bird in the usual sitting posture, and has, therefore, drawn it straight, which gives the bird the appearance of lying on its side with its leg stretched out. From the bill to the farthest part of the croup measures 8ft. 6in., and the average size of the eggs is 8in. long and 6in. through.

Fig. 14.—I think this carving is intended for a monstrous representation of the wombat; it measures 9ft. 8in. from the point of the snout to the end of the body, which is 4ft. across at the widest part. What appears to be intended for a snake,§§ 3ft. 6in. long, is drawn within the larger figure. This animal is carved on the same flat rock as Figs. 8, 10, and 16.

Fig. 15.—This curious monster is carved upon the same flat rock as Fig. 8, and bears some similarity to a turtle. It is 20ft. 6in. long, and 4ft. across the body, around which there is a belt. The lower part resembles some of the human figures carved upon rocks by the aborigines. Near the top of the body one arm is depicted, but there is no corresponding limb on the other side. I am unable at present to offer an opinion as to what the bent object projecting from the body below the belt is intended to represent. In a few other cases I have found grotesque carvings which appeared to be intended to delineate some creature of the artist's imagination.

Fig. 16.—This rudely drawn human figure, 3ft. high, is interesting on account of the three lines or bands across the body, which is disproportionately long, like the body of Fig. 1. It is also uncommon in having both knees bent in the same direction instead of being in the position shown in Figs. 1, 9, 10, and 12 on this Plate. It is difficult to determine what the oval-shaped object in the right hand is intended to represent—perhaps a shield. This carving is on the same flat rock as Fig. 10.

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§§ A snake is mentioned among the Depuch Island carvings.—*Loc. cit.*, p. 83.

On the Construction of the Spirit Level in its application to Instruments for the determination of Geographical Positions.

By Hon. A. C. Gregory, C.M.G., M.L.C., F.R.G.S., &c.

(Read at a Meeting of the Royal Geographical Society of Australasia, Brisbane, April 26, 1895).

The importance of securing accuracy in the instruments employed in the determination of geographical positions has led to great improvements in the means of making angular measurements and in the optical details of telescopes, but though it is equally important that all instruments dependent on their fixed bases should be accurately adjusted to the true level of the locality in which they are placed, the means of determining the plane of the horizon still remain restricted almost entirely to employment of the spirit level, a form of instrument which has not shown any important variation or improvement during the past century, while even the principles of its operation have only been made the subject of theoretical deduction on which we are told that a perfectly straight tube would be useless; that even with an upward curve equal to that of the earth's surface the bubble would remain stationary in any part of the curve, and that therefore the tube should be curved to a less radius than that of the earth, and formulæ are given for the determination of that radius where the length of the tube and required movement of the bubble for a given area of level are made the elements of the computation. Thus one second of arc on the earth's surface is about 101ft., but for our present purpose it may be taken as 100ft. to avoid fractions, and if the bubble were required to move one-tenth of an inch for each second of change of level, the radius of the curve of the tube would be one ten-thousandth of the earth's radius of 20,807,000ft. or a radius for the tube of 2,080ft.; and 12 inches length of tube would be equal to an arc of two minutes of angle. The ver. sine of the tube would be one-hundredth of an inch.

When engaged in the practical manufacture of the glass tubes for spirit levels it became evident that the theoretical curve to a

radius proportioned to that of the earth was not the most important factor of construction.

Thus it was found that within the practical limits of length, straight tubes required a greater deflection from the true level to move the bubble from end to end of the tube than theory required in the case of a curved tube; that the movement of the bubble was governed by the proportion of the diameter of the tube and its length and also the size of the bubble.

At first it was thought probable that the difference between theory and practice resulted from imperfections in the tubes which could not be calibrated after they were closed, and the heating of the ends might have altered the dimensions permanently, but an extremely delicate test of the closed tubes was discovered. This is that when a tube is filled and levelled with the bubble central it is sufficient to hold the warm finger just beyond the end of the bubble, when the expansion of the glass tube causes the bubble to follow the finger to the end of the tube, and it again returns to the central position on the removal of the local source of heat, while the evenness of movement ensures perfection in the inner surface, and if the tube be mounted in collimating rings the true cylindrical form can be proved.

The next step was to mount an eight-inch tube of $\frac{5}{8}$-inch diameter with pistons to form the working ends of the enclosed spirit. This was fixed on a levelling stage along with a telescope to read on a scale 125ft. distance so that deflections from level could be read with accuracy.

In the first experiment a $2\frac{1}{2}$-inch bubble was enclosed in the whole length of the tube, and a deflection of $1\frac{1}{2}$ minutes caused the bubble to move the whole length of the tube.

2. The bubble was reduced to half-an-inch, and it required a deflection of 2 minutes to produce the same effect.

3. The pistons were moved in so as to reduce the working part of the tube to 4 inches, when it required the same deflection of angle to move the bubble from end to end though the distance had been reduced to one-half.

The results indicate that the long bubble is most sensitive.

That though in both the long and shortened tube the bubble moved from end to end with the same deflection, yet the short ube showed only half the lineal movement.

To ensure greater accuracy the old form of circular level was used in the place of the tube level.

This level had a movable glass cover which was carefully tested for truly plane surfaces, the position of the surfaces being reversed in such experiment.

The diameter of the level was $2\frac{1}{2}$ inches and the bubble $\frac{1}{2}$-inch. The deflection required to move the bubble $1\frac{1}{2}$ inches was $1\frac{1}{2}$ minutes of angle.

Thus a straight tube and a truly flat plane cover of glass both showed that the theoretical curvature was not only unnecessary but that the capillary action of the spirit on the surface of the containing vessel has an effect far more energetic than that of the theoretical curvature and in a reverse direction, so that within practical limits a tube of absolute equilibrium would have its radial centre above and not below it, though the data on which the determination of that radius depend are of such variable character as not to admit of practical determination as they involve not only the proportionate size of the bubble, length and diameter of the tube, but also the mechanical condition of the contact surfaces and the character of the fluid employed.

In practice the conditions which are best adapted for the production of an accurate and useful spirit level tube are that the interior be a true straight cylinder and that all curves be carefully avoided.

That the glass covers of circular levels should be true flat planes.

The Lighting of our Coast.

By James R. Atkinson, Licensed Surveyor.

(*Read at a Meeting of the Royal Geographical Society of Australasia, Brisbane, April 26, 1895*).

In dealing with a subject such as I have chosen, I consider it would ill become a layman to enter into too many details of the various lights on our coast (in fact I am not competent to do so), and feeling assured a surplusage of technicalities would not be acceptable, have decided merely to take you along the coast, giving a description of each light and referring to such other small matters of interest as I have been enabled to gather.

Our coast, prior to separation, as far as lights were concerned, was a sort of *terra incognita*, Cape Moreton being the only primary lighthouse, with probably a few post lights in Moreton Bay. Such was the state of things when Captain Heath was appointed Portmaster in 1860, and he at once set to work to remedy them—how far he succeeded is apparent to all; and he can say, *Si monumentum quæris, circumspice*—our coast to-day being like a well lighted city street compared to its then state of darkness.

We will now commence our journey northward, taking our departure from the well-known Pile Light at the entrance to the Brisbane River.

This light is not altogether uninteresting, as it not only serves as a guide by both day and night but it also shews the state of the tides at all times. This is accomplished at night by means of occultations which are produced by an opaque cylindrical shade moved by clock-work descending round the burner. The light is attended to by three men, who keep perpetual watches.

Rounding this light then, a course is steered for Cowan Cowan Point—the vessel remaining in the intensified beam till the light of Cowan Cowan is reached. It is approached close to and is brought in line astern with Tangalooma Light—these two forming a lead which carries a vessel outside Moreton Bay going north in about nine miles.

Tangalooma Light differs somewhat from the others in being three superposed holophotes which condense the whole of the emitted light into one beam of great power.

In connection with the approach to Moreton Bay there are two other lights, Comboyuro Point and the Yellow Patch—one man having charge of both.

We next refer to our fine Cape Moreton Lighthouse, which was built by the New South Wales Government, by contract, in 1857. It is a cylindrical rough-dressed stone tower, 70ft high, the material for which was quarried from the hill to the north of it. It is an excellent piece of work, and up to the present, in spite of its exposed situation, it shews no sign of deterioration.

The light is derived from a 1st order catoptric apparatus of twenty-one lamps set on three faces, the light making one complete revolution in three minutes, and being at such an elevation (382ft. above high water) as to be visible 26 miles.

The luminant here is kerosine, supplied by contract to the Marine Department locally. This oil has to undergo a crucial examination before being passed for use, so that none but the very best is burnt.

Perpetual watches are kept here as at the Pile Light.

Continuing north from this point the next light picked up is that at Double Island Point—so named from its resemblance to two islands when seen from the sea.

On this is a 3rd order dioptric white light, revolving every thirty seconds, and being 315 feet above H.W.M. is visible 24 miles—the tower being 37 feet high.

Specially imported paraffine is used here and three men are required to attend to it. This light serves as a coast light and also assists in picking up the approach to Wide Bay Bar.

Sandy Cape is our next light. It is situated on the extreme end of Fraser's Island, and is a most important one, as it guards vessels from the dreaded Breaksea Spit.

This fine light is on a tower 99 feet high and is at an elevation of 400 feet above H.W.M., so can be seen 27 miles.

The tower is constructed of cast-iron segments bolted together; is well ventilated, and painted white with a red dome, as is the case with all our lighthouses.

The apparatus here is a very fine one, and consists of a 1st

order dioptric white light, revolving every two minutes. The lanticular apparatus is 10 feet in height and 6 feet in diameter, of glass prisms, and has a most beautiful appearance at night when in motion and viewed from the foot of the tower.

Paraffine is the luminant here. The burner is a 4-wick for fine weather, with a 6-wick for bad—the size of the flame in the latter case being 6 inches high by 3½ inches diameter. The establishment requires three attendants.

From this point northerly, some 40 miles distant, is *Lady Elliott Island*—a small patch about 500 yards across, and is practically the southern extremity of the Barrier Reef.

The island is about 5 feet above H.W.M. and perfectly flat. Deposits of guano have been worked here in bygone days and also recently. The light is on an iron tower 60 feet high, containing a 4th order dioptric apparatus, flashing every 30 seconds. Here there are two lightkeepers with their families. A temporary light was exhibited here in 1866.

Bustard Head is our next light. It consists of a cast-iron tower 58 feet high, the light being 330 feet above H.W., and is visible a great distance. The apparatus is a 2nd order dioptric, showing a fixed white light alternated by a flash. This was established in 1868 and is looked after by a superintendent and two assistants. The main light to seaward is white, red sectors protecting the shore both north and south.

Here there is an ingenious contrivance to warn mariners of a submerged rock. It is done by means of a small light, between which and the rock is built a screen. The screen is of sufficient height to allow of the light being seen half-a-mile beyond it; when mariners lose it they know they are within that distance of the danger and go about.

Entrance to Gladstone Harbour.—Here, in addition to the ordinary light, is one known as an "apparent" light. This is situated on the Oyster Rock—a danger lying in the northern entrance to the harbour. Owing to the difficulty in getting off to the rock it was necessary to light it in a special manner and the one now in use was adopted. This consists of vertical prisms set in a frame within a lantern on an iron beacon on the rock. These prisms receive the light projected on them from two 6th order holophotes on shore, and bend that light in the

required directions, giving the appearance to the mariner of a real light. This is one of only three in existence—the others being at Odessa, in the Black Sea, and at Stornaway, on Lewis Island, on the north-west coast of Scotland.

It is proposed to replace this "apparent" light by a lantern which will burn for eight days without attention. These lights have been recently obtained by Captain Almond through the agency of the United States Lighthouse Board, and he is sanguine of their success, both as regards the light and the large increase in their number without additional cost of maintenance.

Gladstone Heads Light was established in 1871. Kerosine is used here.

Cape Capricorn.—Here is a 3rd order dioptric white light revolving every minute, and is placed on a circular iron tower 39 feet high; the light, being at an altitude of 310 feet above H.W., is visible 23 miles. It was established in 1875 and is attended to by three men.

North Reef.—This light is a 2nd order dioptric apparatus, showing a "fixed" and "flashing" white light. It is on an iron tower 80 feet above H.W., and is visible 13 miles. The tower stands on the western side of the reef upon the coral as a foundation, some distance having to be sunk through the sand before this was reached.

The light is a mark for the Outer or Capricorn Channel. Vessels going north after passing Breaksea Spit can either proceed along the coast through Curtis Channel, passing Bustard Head and Capricorn lights, or can proceed through the Outer or Capricorn Channel, the next light on Pine Islet being common to both channels. The distance between the two lights, viz., North Reef and Pine Islet, is about 130 geographical miles.

Pine Islet or Percy Islands.—It is a similar light to the North Reef and is in a tower 45 feet high, the light being at an elevation of 230 feet. It differs only from the North Reef Light in the interval between the flashes. The Islet is a mass of granite about 2 acres in extent, in the fissures of which small stunted pines grow—hence its name.

A point of interest is here in the Normanby Rock—so called owing to the steamer of that name of the E. and A. Company

striking on it about the year 1876. The rock is submerged, but its position is now indicated by a red beam.

Flat-top Island.—This, though not being a primary coast light, is still a well-known one and used by passing vessels. It marks the entrance to the Pioneer River, and is some seven miles from the town of Mackay. It is a 4th order dioptric apparatus; is 174 feet above H.W., and was established in 1874.

Dent Island.—It is practically at the southern entrance to Whitsunday Passage. The light here is a 4th order dioptric white light revolving every 30 seconds, is on a tower 33 feet high and is 120 feet above H.W. This light takes a vessel through the passage by night, *i.e.*, provided it is fine clear weather: in fogs or any sort of dirty weather the most experienced of our pilots deem it incumbent on them to anchor.

In approaching Whitsunday Passage from the south by Hillborough Channel it is not readily made out, the course appearing to be straight ahead. Cook was so deceived, and sailed into the *cul de sac*, and having to return named the bay into which he had gone Repulse Bay. Whitsunday Passage is so well known to northern travellers that it is unnecessary for me to attempt its description, suffice it to say that the hills on either side are from 300 to 1,200 feet high and covered with a dark green stunted pine. The whole length of the passage (about 40 miles) is a constant feast to the eye of the traveller.

Cape Bowling Green.—This is a low sandy point barely above H.W., and has proved a difficult place to deal with. The tower is a circular iron one, 73 feet high, and owing to the difficulty in finding a suitable foundation it was erected on a large wooden mattress which proved in every way sure. The erosion of the coast-line, however, was so ominous that the authorities decided to remove the tower. This would have been a matter of considerable expense to take to pieces and re-erect in its new position, so the matter was placed in the hands of Mr. Pethebridge, Inspector of Works in the Marine Department, and he succeeded admirably in shifting the whole tower, as it stood, some 80 yards to the south-west from its original position and preserving its perpendicularity when so doing. This was no easy feat, but under his able superintendence the work was carried out without the least

accident. Wedges of sufficient size and strength were constructed on which the tower was carefully slid down a wooden incline to its new position. The erosion of the beach continues and is causing the Department no little anxiety. Four men are required to look after this light. Paraffine is the luminant.

Cape Cleveland.—Here we have a tower of 35 feet high, the light being at an elevation of 210 feet above H.W., and contains a 4th order dioptric white light, revolving every 20 seconds. Kerosine is burnt here. The lighthouse is about 12 miles from the harbour of Townsville, and is looked after by two men.

Low Isles.—The tower here is a circular iron one about 65 feet above H.W., and contains a 3rd order dioptric white light revolving every minute. The luminant here is paraffine; and three men are required.

This is a remarkably pretty place, with its dark-green cotton bush about 30 feet high in which the keepers' houses are placed and above which the tall white shaft of the lighthouse shows prominently.

Archer Point.—It is about 12 miles from Cooktown. The tower is 45 feet high and the light is at an elevation of 240 feet above H.W. It contains a 4th order dioptric holophotal condensing apparatus, exhibiting white, red and green sectors of fixed light. Kerosine is the luminant. One man superintends the light.

From an optical point of view this apparatus, though small compared with the large sea lights, is the most interesting on the coast—the light being so condensed through two agents as to emit coloured beams of nearly equal value. The white beam from the light forms a lead with the Rocky Islet Light (a 4th order holophote) to guide vessels between the mainland and the off-lying reefs. The coloured sectors show to the northward and guide a vessel to the entrance to Cook Harbour past the reefs, which here are very numerous.

Grassy Hill.—This is at the entrance to Cook Harbour; is a 4th order dioptric fixed white light, and is 570 feet above H.W. From this point onwards, *i.e.*, northwards, the navigation of the inner route to Thursday Island—a distance of some 350 miles—is exceedingly intricate; submerged coral reefs existing the whole way. The only aids to navigation (except beacons on the reefs

for day use) hitherto established are three lightships similar in all respects.

The lightships exhibit fixed white lights from 6th order dioptric apparatus carried in a lantern on a mast 35 feet above the water, The southernmost of these lightships is at Channel Rock, off Cape Melville; the second one at the No. 6 Claremont Isles, and the northernmost at the Piper Islands.

Goode Island.—Here we have a 4th order dioptric fixed white light, 345 feet above H.W. It marks the western entrance to the Prince of Wales Channel, which is the recognised passage through Torres Straits.

The island is connected by cable with Thursday Island, and thence with the telegraphic system of the colony, forming the last point from whence ships leaving Queensland waters are reported and the first news of their arrival is obtained.

Booby Island.—The Light is 120 feet above H.W. and is a 2nd order dioptric white light flashing every minute. This was the last big light established in 1890. Paraffine is used here and three men are required to look after it.

Booby Island is a mass of rock about 5 acres in extent, without a vestige of vegetation, and I think from its old associations should have been honoured with a more appropriate name. On the western side of it is a cave in which provisions were stored for many years for shipwrecked seamen. Some years ago it was the custom for vessels to sail through the Straits in company as the charts of the day were very imperfect and they did this for mutual protection. In case of shipwreck they knew where to make for for supplies. This cave was also used as a post-office, vessels calling for and leaving letters there.

The last Light (and I am sure you will be glad to hear it) is the lightship at the Proudfoot Shoal, about 50 miles west of Thursday Island. It carries at a height of 40 feet above the water a 5th order dioptric white light occulting every 14 seconds —the eclipse, which lasts 4 seconds, being produced by a descending shade actuated by clockwork.

The vessel being exposed to an occasional heavy sea is much larger than those on the eastern coast, and is manned by a master and four seamen. This is an extremely lonely situation, steamers giving them a wide berth, passing some 8 or 9 miles to the southward.

They are visited once a month from Thursday Island when the stores are supplied and mails delivered.

This ends the actual description of the main highway or primary lights on our coast, but we have missed some (perhaps 200 lights) in our rivers which are worth more than casual notice.

The approaches to the majority of our ports being through rivers and confined waters, necessitated a system of "Leading Lights." This has been most effectively done by the system which Captain Heath devised, whereby a vessel keeping two lights in line till a second pair are picked up can pass through the narrowest waters or avoid dangerous localities with positive certainty.

It is needless to attempt to enumerate the dangerous places on our coast and the very great care it behoves our pilots to take to avoid them, and here I would wish to bear testimony to the keen watchfulness and trained sight of one of our best known and most experienced Torres Straits pilots, Captain Hannah. A very dangerous rock with about 9 feet of water over it at low water was found by him in a remarkable manner.

About seven years ago whilst passing south to Keppel Bay in charge of a large steamer and when some 16 or 18 miles from Sea Hill, he observed a peculiar break which he identified from its appearance as being due to the existence of a rock, the conditions obtaining at the time being low water springs and a heavy south-east wind causing a nasty sea. He reported it and a search was made by the harbour-master at Rockhampton unsuccessfully, and it was considered that it must have been merely a "topping" sea. However, Captain Hannah was not uncertain, but waited six years until he obtained similar conditions and then in the same spot he saw once more the suspicious break. Having obtained careful bearings, the position was laid down and instructions sent to Rockhampton to search for it—the harbour-master in the steamer *Fitzroy* once more spending some time unsuccessfully in so doing. Subsequently search was resumed, and by a happy inspiration the harbour-master ascended Great Keppel Island that he might scan the surrounding water from an altitude, and there he met some aboriginals. "Where rock sit down?" he asked them, and without hesitation they pointed to the identical spot indicated by Captain Hannah.

"Another feller rock!" and a second and unknown rock was pointed out by them; this being out of the track was not so dangerous to shipping but still might have caused disaster in the future.

The importance of this discovery can be gauged when it is considered that this rock exists in a place close to the route usually followed by steamers where the depth of water is about 12 fathoms all round, and where no danger of any sort was supposed to exist.

The only recognition of Captain Hannah's discovery has been the bestowal of his name on the rock, but as this had previously been done in the case of an island further north the honour is not too conspicuous.

It is not too much to say that the discovery would probably have been made sooner or later, but at the cost of a fine ship and perhaps many lives.

But to "hark back" to our coast lighting.

There are yet many places on our coast requiring lights of some sort, but, for reasons well-known to us all, it is not at present easy to provide them. Captain Almond, however, hopes shortly to be in a position to locate perhaps half-a-dozen of Pintsch's Patent Gas-illuminated Buoys, which, once charged with gas, will burn for two months, day and night, at an extremely low cost.

I will just quote an extract from Pintsch's description: "The store cylinders usually employed have a cubic contents of 370 feet each, and two of these cylinders when filled to 10 atmospheres will therefore contain 7,400 feet of very highly-illuminating oil-gas, which is sufficient to charge three gas buoys to a pressure of 90lbs each with gas for two months' consumption, burning day and night."

By placing two large cylindrical holders on board a steamer belonging to the Harbour Department, a supply of gas could be taken to refill any gas buoy.

These buoys, which are splendidly constructed, are plainly seen in the day, and as night comes on so does their light appear They have been subjected to the severest tests on the other side of the world, a buoy not being seen for several days owing to the heavy seas, but yet came out of the ordeal with its light still

bright and unimpaired. These require no looking after, with the exception of the usual periodical charging with gas, and I feel sure that Captain Almond will merit the gratitude of our coasting captains for introducing them.

The gas for any buoys that may be located within a practicable distance of this port would probably be supplied from the Railway gas works here, but in the North gas works could be erected at a small cost.

Captain Almond took a prominent part in the late Conference in Hobart and initiated the idea of a *Joint or Federated Lighthouse Board* for the whole of Australasia, and this probably will be the case in the near future.

The following are our Highway Lights as determined at the Conference on the proposition of Captain Almond.

They are 18 in number :—

Cape Moreton.	Low Island.
Sandy Cape.	Archer Point.
Lady Elliott Island.	Rocky Island.
Bustard Head.	Grassy Hill.
North Reef.	Channel Rock Lightship.
Cape Capricorn.	Claremont Island.
Pine Islet.	Piper Island.
Dent Island.	Booby Island.
Cape Cleveland.	Proudfoot Shoal.

The following is a comparative statement of yearly expenditure of the different Colonies, from which it will be seen that we do more than our share towards the lighting of Australasia :—

New South Wales	£11,099
Queensland	20,000
South Australia	10,000
Tasmania	7,698
Victoria	16,064

Our coast certainly is of abnormal length (2,200 miles) which it is imperative for us to light, still there are several of our lights which are used by passing vessels and to the cost of which they in no way contribute.

This will probably be dealt with by the Federated Board proposed by Captain Almond.

In concluding this rather lengthy, jerky and imperfect paper I must refer to the great courtesy and kindness of Captain Almond, our Port Officer, and Mr. Cullen, Marine Surveyor, who have done all in their power in a very limited time to render me every assistance and information, and I can only regret that I have made such poor use of it.

It has occurred to me while arranging this paper the extremely solitary lives the various keepers of our lighthouses and lightships must lead, especially the latter, and how those lives might be lightened somewhat by gifts of literature of various kinds, illustrated papers, "yellow backs," cheap editions of standard works; and, lastly, we must not forget the little ones, who, though so far away from others of their own age, can still appreciate "fairy tales" and other suitable juvenile books.

Any contributions of the sort will be thankfully received by Captain Almond, who will see to their distribution.

Address to the Royal Geographical Society of Australasia, Brisbane.*

By the President, J. P. Thomson, F.R.S.G.S., etc.,

Corresponding Member of the New York Academy of Sciences, etc.

In an anniversary address of this kind, it seems to me a first duty to acknowledge how deeply sensible I am of the honour you were pleased to confer upon me by unanimously electing me to the distinguished position of President of this Society at last annual meeting. True it is that since the foundation of the Society I had always endeavoured to further the interests of our cause in every possible way during many years ot actual self-denial, as honorary secretary, and there was indeed a time during an earlier period of our history when the secretarial duties were combined with those of treasurer and librarian. But these labours were lightened and enlivened by the love and enthusiasm that inspired them, by the support of a few personal friends, and by the hope that my adopted country and its rising generation would be benefited, both educationally and commercially, by a well-established national institution for the collation and dissemination of geographical knowledge. That my fondest hopes were not altogether in vain, nor the efforts so cheerfully given fruitless is, I think, clearly enough shown by the recognised position we now occupy amongst the scientific and literary institutions of the world, and by the splendid collection of valuable books and maps with which our library shelves are enriched. To the honest labourer for love, whether physical or mental, no other recompense is looked for than an inward consciousness of endeavouring to do good. Still in the case of ourselves we may fairly claim that our efforts have been amply justified by results. It seems to be a custom, sanctioned by usage, that the President of a Society such as ours should have

* Delivered at the Anniversary Meeting, July 22nd, 1895.

conceded to him the privilege of delivering an address to the members at the end of his term of office. That, in fact, appears to be the last act of a drama in which he has had to play the leading part—by no means an easy one, although in this case peculiarly pleasant. In my own case it must be confessed that a difficulty was experienced in the choice of a suitable subject, not but that there are several important and even interesting ones, more or less connected with the department of geography, in which I claim to take a deep interest, but it seemed to me undesirable to re-traverse fields already occupied by my predecessors. At one time a presidential address was supposed to deal more or less with the work of the Society during the preceding year, pointing out at the same time what had been done in its particular department in other parts of the world, with a plan for future operations. In some societies the practice is still followed out, but in my own opinion the wisdom of such a custom is open to doubt, and it is well to consider whether it is not better to deal with some local or special subject, leaving the operations of the Society to be summarised in the report of the Council, and the departmental work in other parts of the world to the special treatment of the older and larger societies. In this way the provincial bodies would act as tenders or feeders to the parent societies in Great Britain and the continent of Europe, supplying them with trustworthy local material for the department of national or universal geography. Such a recognised plan of action would doubtless result in universal federation of workers in the field of geographical science. It would also lead to a more thorough and exhaustive treatment of the various departmental subjects than they at present receive, and would result in uniformly organised, concerted and systematic action in the field of labour.

On this occasion I shall endeavour to follow in the footsteps of one of my distinguished predecessors, Sir S. W. Griffith, who, in his very learned and interesting presidential address to this Society in 1891, dealt with the "Political Geography of Australia" (1).

To the native-born, and to those whose homes and family ties naturally bind us all together in a common bond of union under the Southern Cross and the other beautiful constel-

lations of the southern sky, there is no other country on the face of the earth so dearly beloved as Australia. None is certainly more important, and it is not to our credit as a people that while our school children are crammed with what after all is only a superficial and inadequate knowledge of all other parts of the world, little attention is given to our own country, to our industries, or to our natural and artificial resources. To the credit, be it said, of a public-spirited journal, the subject of our national industries has recently received special treatment, and it is hoped the *Courier*, to which I particularly refer, will devote equal time and attention to other phases of our partially or wholly undeveloped resources. The Physical Geography of Australia demands fuller treatment than it has hitherto received by any Society of this kind, for while we are always ready and anxious to extend our investigations over wide and remote fields the needs of our own country are too often overlooked. It is no doubt true that several parts of the interior of Australia are either wholly unknown or but imperfectly known. Enormous tracts of sterile and waterless country have baffled the efforts of many travellers to investigate the inland regions, and it is only quite recently that several important discoveries have been brought to our knowledge through the enlightened and patriotic enterprise of two South Australian gentlemen, Sir Thomas Elder and Mr. Horne, of Adelaide, who with praiseworthy liberality defrayed the cost of two separate and well appointed scientific expeditions to Central Australia. The absence or scarcity of reliable information concerning the more remote parts of the continent may no doubt account to some extent for the little attention hitherto bestowed upon its physical geography as a whole. As an example of how insignificantly Australia has until very recent years been regarded by intelligent and well informed Europeans, I will just quote the concluding sentence of the introductory paragraph of an article in a standard work on geography, published in 1885, by Longmans and Co. of London: "But recent events have conferred upon Australia an importance which justifies our making it the subject of a distinct chapter" (2).

A backward glance at what we assume to be the earliest stages of evolution of our continent, through successive geological ages, will enable us to realise more fully the distinctive pecu-

liarities of its physical aspect, as well as of its past and present climatic conditions, as influenced by the various progressive steps of development. Let us commence with the Palæozoic period during which we find a few raised disintegrated fragments of a submerged plateau projecting above the surface of the ocean. In Western Australia the dry land at this stage is represented by an elongated area extending from the 20th parallel to the neighbourhood of the Swan River. The western or extreme outer fringe of this fragment now lies submerged outside of the present coast line, and consequently it forms a section of the ocean bed within the limits of the 1,200 to 6,000ft. contour line. A somewhat similar upheaved tongue-shaped area extended from Melville and Bathurst islands southwards into Central Australia, and, like the former fragment, its north-west edge or shoulder is now submerged in the neighbourhood of Anson's Bay within the 1,200ft. contour line. The remaining continental patches above water were represented by a few superficially small and isolated narrow elevations along the eastern seaboard of the continent, distributed over an extensive northerly and southerly range from Cape York Peninsula to the Australian Alps. These insulated fragments were, according to Professor James Geikie (3), the Hon. A. C. Gregory (4), and other well-known authorities, the earliest representatives of this continent. The climate of this and the other continental divisions of the globe must have possessed a remarkable uniformity of character throughout the whole era to which reference has been made. The areas of dry land being comparatively small, offered little impediment to the free circulation of ocean currents, and thus by the commingling of polar and equatorial waters an exceedingly mild and equable temperature was maintained. The succeeding stage of evolution was marked by the somewhat rapid and wide extension and unity of land areas. Insulated fragments increased in magnitude, assuming more truly continental proportions during the Mesozoic era. A narrow belt of dry land, corresponding to the position of the Great Dividing Range, extended along the whole seaboard of Australia, uniting Tasmania, New Guinea, and Borneo. The whole western half of the continent was likewise raised above the surface of the ocean, curving westward to Java, Sumatra, and, effecting a junction with the eastern area at

Borneo, stretched northerly to the south-east portion of India.* Owing to this remarkable process of evolution, an enormous gulf or inland sea swept the whole central region of Australia, extending northerly and westerly to the southern shores of Borneo. The climate during this period was in like manner uniform, though less persistently marked than in earlier times. In the dawn of Tertiary times, Australia had become entirely continental or insulated. The connecting belts, which formerly united it with neighbouring countries, were submerged, and the inland waters were confined to a tract of submerged country in the neighbourhood of the junction of the Murray and Darling rivers. Besides this the sea encroached upon the coast districts of the Gulf of Carpentaria, also upon a portion of the coast fringe in Western Australia, between Shark's Bay and Cape Leeuwyn, and a narrow section along the head of the Great Australian Bight was also submerged, but in all other respects the general conformation of our continent was almost identical then with what it is now. Contemporaneous with this physical change in the geographical aspect of the country a pronounced differentiation of climatē occurred. Climatic zones possessing marked and distinctive characteristics existed, and in these mild seasonal changes prevailed. Although I have already remarked upon the uniformity of climate during the two preceding ages, still it seems reasonable to suppose that the atmospheric air was then more highly charged with moisture than we can at present conceive it to be, and that the rainfall in tropical and extra-

* It is not by any means improbable that during this age there was actually a land connection between Australia, New Zealand, the Antarctic Continent, and Patagonia. On a map accompanying a paper read before the Royal Geographical Society, and published in the *Geographical Journal*, January, 1894, Dr. John Murray shows that these lands are connected by a submerged plateau over which the soundings are very shallow, compared with the enormous depth of the neighbouring ocean bed. The strongest evidence in support of this theory is, however, to be found among the fragmentary remains of extinct animals recently discovered in these now widely separated regions. In the Chatham Islands there have been found the remains of a large ocydromine rail and the fossil bones of a coote, allied to other extinct families that formerly inhabited Mauritius, and were probably distributed over a very wide geographical range of the southern hemisphere. There is also the occurrence of struthious birds in New Zealand, Queensland, Madagascar, and Patagonia, which seems to indicate that they were scattered about at a time when there were few impediments to interfere with their migratory movements over immensely wide areas, part of which is now occupied by the waters of the South Pacific Ocean.

tropical regions must have been enormous, owing to the widely distributed equatorial waters over vast areas of the globe, and the extensive circulation of ocean currents. It is worthy of note that the predominating topographical features of the continent do not appear to have undergone any remarkable change during the successive stages of evolution under review. The dominant areas of elevation in all cases correspond throughout with the mountain ranges along the eastern seaboard, the Northern Territory and Western Australia, while the Central region is still characterised by low and extensive desert-like saltbush plains, dotted with shallow lakes and saltpans, and traversed by inland rivers. Configuration and position of land areas are two of the fundamental agents that operate in establishing and controlling the climatic zones of our globe, while their influence upon the distribution of rainfall is simply enormous. To enable us to study and understand the people of a country it becomes necessary and indeed indispensable to investigate the physical features and climate, for no other known agents exercise so powerful an influence on the grouping and migrations of the race as these, as well as in moulding and modifying classes and racial types. As compared with other countries, there is a decidedly marked defect in the physical geography of Australia. It possesses no remarkable mountains of high elevation, although the culminating peak of the Australian Alps is capped with snow for nearly all the year round. The highest ranges border the east coast line, extending in a more or less continuous chain from Wilson's Promontory in the south to Cape York in the north. Except the McPherson's Range, this great coastal chain of ranges is practically of no value in limiting or influencing the political divisions of the country, nor yet does it afford any very great impediment to or security against invasion. In most places it is easily accessible from the seaboard, and it possesses no narrow wild passes such as those that limit the great commercial inland trade routes in Europe, Asia, and America. One remarkable feature associated with the physical condition of the south-eastern part of the continent is that the highest elevations correspond very closely with and occupy a position adjacent to the greatest depth of the ocean, which approaches closer to the south-east coast line of Victoria than to any other part of the continent.

The general plan or system of this eastern area of elevation may be briefly put in the following manner :—From the main coastal range there radiate towards the interior numerous offshoots or lateral spurs as it were, and these form the watersheds of the inland rivers as they are called, or streams that flow towards the interior. These outliers bear local designations, more or less appropriate, such as the Liverpool Range, New England Range, and Blue Mountains in New South Wales. The eastern face of the range approaches close to the coast line, and its waters are drained by several comparatively short but rapid rivers that frequently overflow their banks and inundate large areas of low-lying country during abnormal rainfalls. In Queensland there is probably a wider and more uniform distribution of elevated areas than in any other part of the continent. Here the elevations of the Coast or Great Dividing Range, as it is locally known, vary from 2,500 to 4,000ft. above sea level. Barklay's Tableland and Selby and Kirby's ranges separate the Gulf rivers from the Georgina, Hamilton, and Diamantina streams that flow south-westerly. McPherson's Range, which forms a natural boundary common to New South Wales and Queensland from Point Danger to the junction of Tenterfield Creek with the Severn River, culminates in Mt. Lindsey, 4064ft. above sea level, but besides it there are several other high and rugged peaks along the crown of the range. Gregory Range, a lateral spur of the Great Dividing Range, divides the waters of the Gilbert and Flinders rivers. Drummond Range lies between the waters of the Belyando River and those drained by the Nogoa and Isaacs streams. The waters of the Burnett and Auburn rivers are separated from those drained into the Dawson by Dawes Range, while the waters of the last stream are also divided from those of the Comet River by Carnarvon and Expedition ranges.

The country between the Great Dividing Range and the eastern coast line mainly consists of undulating and low-lying alluvial areas, with intervening river valleys abundantly watered and remarkably fertile. It is within the central and northerly parts of this division the great industrial enterprise of sugar-growing and manufacture is successfully carried out and developed, it having been found that the soil and climate are eminently adapted to the growth of sugar-cane on some of the coast

lands of New South Wales and Queensland. West of the range the physical character of the country changes entirely. Here we meet with extensive plateaux or tablelands extending far into the interior of the continent. In New South Wales the most important of these are the Monaro Tableland, the Great Western Plains stretching to the River Darling and into South Australia, and the New England Plateau in the northern part of the colony. Some of these tablelands are utilised for agricultural purposes, but by far the largest portions are held for pastoral occupation.

In Queensland the western districts comprise the widely known "Downs" country, consisting of immense tableland plains, interspersed with comparatively small areas of hilly and undulating country, extending far and away into South Australia. The Gulf district, or that part of the country bordering upon the head of the Gulf of Carpentaria, mainly consists of extensive plains, abundantly watered and luxuriantly grassed. Except to a very limited extent, agriculture receives but little attention within this vast geographic division, extending the whole length of the colony west of the range, although experience has amply shown that the soil and climate of the Darling Downs country is naturally adapted for the production of luxuriant crops of almost every variety of agricultural produce. Nature has endowed it with inexhaustible resources that await development at the hands of enterprising colonists. At present the country is mostly held for grazing purposes, but its potentialities are undoubtedly great, and as settlement advances and railway communication extends and increases the whole of the western districts will doubtless be occupied by flourishing agriculturists, to whom the soil will yield all the necessary products upon which the prosperity of a country so much depends, with profit to producers and immense advantage to the country. This, in my opinion, is a very moderate and indeed limited forecast of the future of this part of our continent.

In the Northern Territory of South Australia there are no lofty ranges or mountains of high elevation, although the physiography of that part of the country possesses many features of great interest to geographers as well as to geologists. About Leichhardt's description of the country there seems to be some doubt, owing, it is said, to an error which unfortunately crept

into the transcript of his notes. This, however, does not apply to the extensive observations made there by the Hon. A. C. Gregory, who was in a position to obtain a true and very comprehensive knowledge of the subject. Mr. Gregory's investigations show that the physical structure of this northern region consists of a moderately high and continuous tableland, very broken and extremely rugged, rising abruptly from the low-lying northern coast lands and extending southerly to Central Australia (5). This description is sustained by Capt. Carrington, who, some few years ago, examined the rivers of the Northern Territory (6). On the other hand exception is taken to this view by the late Rev. J. E. Tenison-Woods, who examined part of the country on behalf of the Government in 1886 (7).

In his official report to the Government Resident of the Northern Territory, Mr. Tenison-Woods endeavours to "correct the erroneous idea which has prevailed as to the physical" character of the region, pointing out that *where he had been* "there is no such thing as a continuous tableland." "Patches of broken tablelands occur frequently at the sources of rivers and creeks," but they are nothing more than fragments, seldom exceeding 4 or 5 miles in width and from 120 to 300ft. in height. Only once did he see a plateau of 370ft. in height. The broken edge of these tablelands always face northerly. "The coast country is" generally "very low and flat," rising gently at the rate of about 5ft. per mile. In places there are low ridges composed of quartzite, slate, and sandstone that rise almost from the sea level to a height of 50ft. or more, gradually increasing to 100. They run northerly and southerly, trending to the eastward as they are traced to the south. Small creeks and tributaries emanate from these ridges, descending towards the permanently-watered main valleys. The sources of all the waters drained to the north are in the elevated lands of the metalliferous ranges and the springs at the foot of the tableland. The features of the country change south of Pine Creek, about 150 miles from Palmerston, where there is a watershed about 800 feet above low water sea-level, beyond which the watercourses flow southerly and westerly until the Katherine River is reached. This large stream then flows north-westerly, debouching into the sea as the Daly River.

The mountain system, if such it can be called, comprises the ranges in which the principal mines are found, no part of which seems to exceed 1000 feet above sea-level. The system is an isolated one, culminating in Mount Wells on the north and the country between the Union Mines and the Mary River on the south. The River Finniss cuts it off to the north.

This is the conclusion arrived at by the late Rev. J. E. Tenison-Woods, and it is no doubt a correct one in so far as it applies to that part of the country over which his examination extended, but it is believed by those who are alone competent to speak with undoubted authority upon the subject, that he did not penetrate farther inland than the disintegrated coastal fringe of the great central plateau, which, according to the Hon. A. C. Gregory, undoubtedly occupies the interior of the northern and north-western territory. This country was traversed and minutely examined by Mr. Gregory during his expedition in North-western Australia, and to those who know how keen and careful an observer our veteran explorer is, nothing more conclusive will be required than his clear and simple statement concerning the physical structure of the country, as set forth in the *Journals of Australian Exploration*.

To pastoral and agricultural enterprises this Northern Territory offers most tempting inducements; the average rainfall is over 5 feet; the soil in the river valleys is remarkably rich and fertile, and immense plains carpeted with luxuriant grasses and other forms of vegetation await occupation. This description particularly applies to the country drained by the Victoria and Fitzmaurice rivers and Stuart Creek, representing an area of about 100,000 square miles. Captain Carrington in his report upon the examination of the rivers in this part of the continent says that "The agricultural future of this great country can only be limited by the limited faculties of mankind. Nature has apparently done everything possible."

The western part of the continent is not remarkable for high mountain ranges or for rugged peaks, although several elevated and isolated masses occur in some parts of the country, presenting a somewhat striking appearance. The Darling, Roe, and Blackwood are the principal ranges in the south-west, the first extending north and south parallel with the coast for a distance

of about 300 miles from Yatheroo, in the north, to its most southern limit at Point D'Entrecasteaux. It is from 18 to 20 miles from the coast line, and its culminating point is about 1500 feet above the sea-level. East of and parallel to the Darling lies the Roe Range, whose crowning eminence is denoted by Mount William, in the Murray District. The highest peak of the Blackwood Range is only some 2000 feet, although its average elevation is higher than that of the other neighbouring ranges. The Stirling Range is the highest natural feature in the settled districts of the colony. It rises abruptly from a low-lying coastal country, and owing to its isolated position may be seen a long way off. Ellen's Peak and Mount Toolbrunup, some 2320 and 3341 feet respectively above sea-level, mark the culminating points of this range. To the south-west of it the Porongorup Range is situated. The Leopold and Mueller ranges constitute the principal heights in the Kimberley District. Mount Amherst, the loftiest peak in the latter, is elevated some 2533 feet above sea-level. Between the Panton and Elvire rivers there is situated a hill known by the name of Mount Barratt, whose height is 2297 feet, and Mount Coglan, on the watershed of the Margaret and Ord rivers, has an elevation of 2084 feet.

In the settled districts the country is generally level; in places undulating, but seldom mountainous. The land on the western seaboard is also flat and the soil sandy. East of the Darling Range there is a remarkable change in the character of the country, which continues to improve as it extends inland. Vast forests of Jarrah and white and red gums occupy the whole of the uncultivated portion of the south-west districts, except a few sand-plains that are here and there scattered over the face of the country (9).

From Israelite Bay, in the neighbourhood of which is situated the Russell Range, to Spencer's Gulf no high ranges or even mountains of moderate elevation exist—the only distinctive physical feature in the topography of that enormous stretch of territory along the periphery of the Great Australian Bight being a succession of sandstone cliffs from 300 to 600 feet vertical. Most of the country within this extensive region especially north of the 30th parallel and west of the 133rd meri-

dian consists of immense stony and sandy desert, whose repulsive and inhospitable aspect is a significant warning to the traveller who dares to step on the border and scan the enormous expanse of eternal wildness beyond. Thick mallee scrub, spinifex sandhills, claypans, dry salt lakes (as they are strangely called), and bare sandy plains invest the whole face of the country with a dull and painful monotony. The soil is dry and the scanty vegetation usually parched and withered, for there is little water; indeed, there is one stretch of country between Queen Victoria's Spring and the Boundary Dam, a distance of 325 miles, entirely destitute of water.

The belt of country south of this region to the coast line improves vastly in character, both as regards soil and vegetation. This is especially applicable to the extensive Nullabor Plains, at the head of the Bight, which are believed to be "eminently adapted in every way for pastoral purposes and probably for the growth of cereals" (10). The large clayey deposits that exist in many places here will probably enable settlers to conserve the water, and this feature in the physical structure of the locality will, doubtless, greatly increase the value of the country as settlement advances. The Nullabor Plains extend for about 250 miles from east to west, their northern limit being unknown. They are luxuriantly grassed and have been crossed at times when "the long line of camels left a trodden track behind them in many places as there would be if they had passed through a cornfield" (10). The map of the coastal district west of these plains is annotated with such brief descriptions as "Low level country covered with dense thickets and scrub, and apparently salt lakes and marshes, the horizon appearing from the southward level and uniform as the sea." "Clear open grassy country." "From this point vast plains of grass and saltbush with scarcely a tree on them, extending as far as the eye can reach in every direction." "Very gently undulating grassy country. Limestone formation 300 feet above the sea" (11). Northerly and easterly of these plains the geological formation appears to be granite covered with sand. The granite outcrops occur in many places, and it is interesting to note that the only permanent water for many miles in any direction seems to be at a range where the granite ends and the limestone formation begins.

In the south-eastern districts of South Australia the general physical aspect of the territory affords a pleasant contrast to that of the country to the north and north-west. Here are located several prominently marked areas of elevation, denoted by the Mount Lofty, Flinders, Hummocks, and Gawler ranges. Of these the first extends from Cape Jervis northerly about 80 miles to the Little Para River; its culminating point, Mount Lofty, being 2334 feet above sea-level. This range, which follows the general course of the Murray River to the 34th parallel of latitude, is flanked on the eastward for about twenty miles by a chain of ranges of less prominence, extending from Encounter Bay in broken masses to Ulooloo, a distance of nearly 200 miles, and including the following conspicuous points:—Mounts Magnificent (1372 ft.), Barker (1681 ft.), Gould (1753 ft.), Rufus (1807 ft.), and Bryan (3065 ft.); the Burra Hill (2018 ft.), Kaiserstul (1973 ft.), and Razorback (2835 ft.). Smaller ranges, Barossa, Julia, Princess Royal and Never Never lie to the north of Mount Lofty Range.

The Hummocks, or Barunga Range, commences on the west side of Gulf St. Vincent, about 10 miles from the head, and runs northerly for 60 miles to the Broughton River; South Hummock, Black Point, and Barn Hill are its most prominent features, the first being 1064 feet high.

Flinders Range commences on the Broughton, a little south-east of the termination of the previously named range, and runs northerly by way of Mount Remarkable (3178 ft.), The Bluff (2300 ft.), Mount Brown (2200 ft.), Mount Arden (2750 ft.), and St. Mary's Peak (3900 ft.), for about 200 miles, having steep spurs to the west and less elevations on its eastern side. Among the last are the Wonoka, Wilpena, Elder, Chace, and Druid ranges. It then continues in a north-easterly direction by Mount Serle (3000 ft.), and Freeling Heights (3120 ft.) to Mount Distance for 120 miles farther.

The Gawler Range is an irregular group of hills, commencing about 50 miles west of Port Augusta and extending westerly for about 150 miles more. The highest points in it are Mounts Miccolo, Nonning, Sturt, Double, Yardea, and Yarlbrinda, none of which exceed 2000 feet above sea level.

Under the name of Musgrave Range are usually included the

Everard, Mann and Tomkinson ranges and the Deering Hills, all situated in Central Australia, between the 129th and 133rd meridians and forming a belt 250 miles by 25 miles lying east and west along the 26th parallel. The highest points are Mounts Woodroff and Morris (each about 4100 ft. high), Ferdinand (4000 ft.) and Everard (3850 ft.) To the north of these is another central belt lying north-east of Lake Amadeus and known as the McDonnell Ranges, extending east and west along the 23rd parallel. Besides these principal highlands there are several isolated volcanic peaks at the head of Discovery Bay and many other hills of less prominence in the central portion of the country.

From the preceding remarks it will be readily understood that most of the South Australian territory consists of vast grassy plains, some of which are flanked by the mountain ranges for fully 300 miles north and south, and extensive belts of undulating timbered country, the latter comprising some of the richest agricultural land in the colony, especially that situated between St. Vincent's Gulf and the Murray Scrub, and in the fertile district of Mount Gambier. A very large portion of the country stretching along both sides of the Murray River is an immense waterless scrub, occasionally interspersed with open grassy plains, while enormously large areas of sandy desert and salt-bush country occupy the far interior in the neighbourhood of lakes Amadeus and Eyre.

In the foregoing an attempt has been made to describe briefly the dominant areas of elevation as indicated by the mountain systems of our continent. These are certainly unique in their way, and the somewhat remarkable features that they possess invest the topography of the country with a striking peculiarity which does not occur elsewhere. As I have already remarked the mountain ranges are, with one single exception, practically of no value whatever as natural national boundaries, nor even for the purpose of forming provincial lines of demarcation. On the other hand their influence upon the commercial development of the country is great, for they limit settlement in a large measure to the coastal districts, offering few facilities for the extension of agricultural and industrial enterprises to the central regions. This is especially the case along the eastern part of Australia, where the massive vapour clouds, impinging upon the

seaward face of the ranges, deposit most of their moisture before the western and central districts are reached, and consequently the latter do not enjoy an adequate rainfall. True, the future holds out more encouraging prospects to intending settlers than the past, for we are assured on the authority of Mr. R. L. Jack (12), Government Geologist for Queensland, that to the artesian water supply of the western part of that colony there is practically no limit. In his recent elaborate investigations into the geological structure of that part of the country Mr. Jack appears to have satisfied himself that the "water-bearing beds of the Lower Cretaceous formation" are far more extensive than had formerly been anticipated. The superficial area in which they occur is estimated at 5000 square miles of Queensland territory alone, and more extensive examination will very probably show that they are far more widely distributed in other parts of the interior of the continent than Mr. Jack's recent investigations have shown them to be. The physical structure of the country is certainly favourable to this view, and if it be found that these water-bearing beds actually occur over the whole area formerly occupied by the great inland sea, by which our continent was severed from north to south, the barren desert country of Central Australia will no longer bid defiance to the extension of British enterprise and settlement.

As far back as 1863 the late Rev. J. E. Tenison-Woods, in a paper read at the meeting of the British Association at Newcastle-on-Tyne, on "The Rivers of the Interior of Australia," drew attention to the favourable conditions of the central basin for the formation of artesian wells, and in 1866 the same view was strongly advocated in a series of papers which that well-known authority contributed to the *Australasian* (13). Later on Mr. Tenison-Woods pointed out that "In the central depression of the continent and in North Australia there is a line of groups of thermal and cold springs covering several hundred square miles. These send forth water from great depths, and are, no doubt, derived from a central underground reservoir whose sources are on the slopes of the tableland. That the waters come from great depths is seen from the fact of the temperature and the mounds of sinister or travestine around them" (14). Of course no artesian water supply, however extensive, can

equal in value a natural one, nor yet will it ever take the place of a regular and abundant rainfall; still, it will operate as an enormously powerful factor in the development of the natural and artificial resources of the country, and it is hoped that recent investigations will be followed up with equal success in other parts of the continent, to the manifest advantage of our pastoral and agricultural industries and national prosperity.

In addition to what I have said regarding the influence of our continental highlands upon the distribution of rainfall and settlement, it must also be pointed out in this connection that the only true river system of the country is so regulated and controlled by the peculiar physical structure of the mountain ranges of the south-eastern part of the continent that few of the rivers themselves are of any value as great commercial highways from the sea to the interior. On the eastern coast most of the streams are short and traverse areas of steep declivity. During periods of heavy rain their capacity is inadequate to carry off the surface waters and consequently they overflow their banks, inundating the low-lying country and causing great destruction of property—sometimes even loss of life. The larger rivers flow inland from the coast range and disembogue on the eastern shores of the Great Australian Bight; while some actually discharge their waters in the interior of the country into large shallow lakes or wide marshes.

The Murray, with its giant tributary the Darling, is preeminently king of Australian rivers, and in point of "navigable length" it is, according to the estimate of Mr. H. C. Russell, entitled to rank "third amongst the navigable rivers of the world"! (15). It is, however, only right and proper to point out that this is not a fair comparison. From a geographical standpoint it errs greatly on the side of exaggeration, for while it may be true that the Darling River is navigable from Walgett to its junction with the Murray River and thence by that stream to the sea, a total length of some "2345 miles," the assertion itself furnishes no adequate estimate of the actual capacity of the channel for the purpose of navigation. As an inland stream for navigation the Murray River * is of considerable importance,

* The Murray River is here referred to as the primary watercourse with which are united the Darling, Murrumbidgee, Lachlan, and other tributary streams, with their numerous affluents, the whole constituting the Murray River System. In speaking generally of the first, the others are, therefore, included unless otherwise stated. In a

and the immense value of its water supply for irrigation canals can scarcely be over estimated, but at present it cannot be utilised as a great commercial highway from the sea to the interior, and for this reason alone no comparison can be drawn between it and many other shorter and minor streams of the world. The shallow entrance to the river and the comparatively insignificant volume of water that passes through the channel in dry seasons, are enormous obstacles which may possibly be removed at some future time when the country is more closely settled and its commercial and industrial resources more generally developed. Free and uninterrupted navigation from the sea to Walgett and from the sea to Albury would exercise a greater and more permanent influence upon the future prosperity of the country and its potentialities than it is within the power of any one to conceive, and if that were once accomplished the Murray would rightly be entitled to rank amongst the first navigable streams of the globe. The total drainage area of the Murray River as recently determined by Mr. H. G. McKinney, M.Inst.C.E., is 414,253 square miles (16), equal to about a seventh of the area of the entire continent, and as large as the combined areas of France and Germany. This is the twelfth largest river basin of the world. Of this enormous area 234,362 square miles are situated in New South Wales, 104,575 in Queensland, 50,979 in Victoria, and 24,387 in South Australia. The whole basin is divided into two unequal areas—an effective or contributing area of 159,889 square miles, with a mean annual rainfall of 25·03 inches, and a non-contributing area, or that which either contributes nothing to the river system or which contributes only during exceptional floods, 254,364 square miles. The mean annual rainfall over the latter does not exceed 17·15 inches. The largest non-contributing area of 158,863 square miles, lies within the colony of New South Wales, comprising a tract of country east of the Bogan and Darling, an extensive region bounded by the Darling, Murray, Murrumbidgee, Lachlan, and Bogan, and the territory west of the Darling. The whole drainage area of 24,387 square miles within the territory of

published diagram showing the comparative lengths of the great rivers of the world the Darling is indicated as the primary stream and the Murray as one of its principal tributaries. This is certainly erroneous, for so long as the channel from the sea to Wentworth is known as the Murray River the Darling, which unites with it at the latter place, cannot be otherwise described than as a tributary of it.

South Australia contributes nothing to the river system; here the mean annual rainfall is only 16·83 inches. The delta lands and other non-contributing areas of 36,835 square miles in Queensland lie chiefly along the southern boundary of the colony within the counties of Belmore, Carnarvon, Cassillis, and along the middle basin of the Warrego River, the mean annual rainfall over that part of the country being about 18·97 inches. The area of 34,279 square miles in Victoria that contributes nothing to the river system is a strip of country south of the Murray and west of Morong, where the mean annual rainfall is something like 17·85 inches. Most of these non-effective areas consist of immense alluvial plains and gently undulating country where the rainfall is very small and uncertain; the soil is remarkably rich, and if irrigated would be highly productive. There is a mean annual rainfall of 20·19 inches over the whole drainage area of the Murray River. Considering the enormous extent of the watershed the sectional areas of the primary river and its chief tributary are insignificant. The mean average discharge of the River Darling at Bourke is equal to about 6557 cubic feet per second, and the approximate mean height of water level for a period of 12 years was 10 feet. The mean average discharge of the Murray River equals 2,791 cubic feet per second at Euston, 6,336 at Modina, and 3,516 at Albury. The approximate mean height of water level at the same places for 1879-1890 was 15·6, 16·10, and 12·10 feet respectively. At Albury the discharge of the Murray very rarely falls below 1,000 cubic feet per second, even in the driest seasons.

The primary source of the Murray River proper is in the western face of the Australian Alps at the union of two lateral spurs, by which it is flanked on the east and west, about 20 or 30 miles north of Mount Kosciusko, whose peak of 7256 feet above sea level marks the culminating point of the great southern cordillera. It flows southerly between these spurs or mountain ranges, skirting the north-western base of Kosciusko, where it sweeps towards the north-west and joins the Indi River, whose source is within the Victorian territory. The entire length of the Murray is about 1700 miles, but there is a remarkable discrepancy between writers upon this subject—it being indeed almost safe to state that no two authorities agree upon the point

at issue. The head of the upper valley of the river is characterised by the presence of a network of tributary streams or feeders, spreading out like the branches of a great tree, through whose sharply sloping and precipitous channels the thawed waters of the snow-capped ranges sweep in mighty torrents to the lower regions of the valley. Chief among these are the Mitta Mitta, Ovens, and Goulburn watercourses. The physical aspect of this part of the country is wild and rugged—heavy snowstorms, violent gales, and blinding sleet being the ruling climatic features of this great Alpine chain, whose western and northern waters cut deep into the granitic and metamorphic rocks of the range, forming steep and precipitous gorges, yawning chasms and tortuous channels, ever deepening by the erosive action of the troubled waters of many streams. The Murrumbidgee, although one of the tributaries of the Murray, is little inferior to that stream itself. Emanating from its source in the elevated tableland at the base of Peppercorn Hill, some 5000 feet above sea-level it traverses a tract of country possessing some remarkable features of natural beauty, especially in its upper valley, where the mountains are steep and rugged and the lateral valleys deep and precipitous.* Below this region the river flows through the celebrated Riverina district, where its flood waters often spread out over large level areas in the neighbourhood of numerous shallow watercourses which act as local distributors. In seasons of severe drought it is nearly dry in some parts of the channel, even as far down as Hay, where the bottom is sandy and consequently highly absorbent. The total length of the Murrumbidgee is 1350 miles. Its principal affluent is the Lachlan, a stream of about 700 miles in length, rising in the rugged western spurs of the Great Dividing Range, north of Lake George. The highest part of its watershed is about 3000 feet above sea level, where snow seldom falls in sufficient quantity to materially influence the flow of the river. The lower valley embraces long stretches of level plains, interspersed with belts of stunted gum, mallee, and saltbush, and in dry seasons the channel of the stream is indicated by a mere chain of waterholes.

* About a year's sojourn in this part of the country and on the head waters of the Snowy River, gave the writer an excellent opportunity of observing the physical structure of the locality and its climate.—J.P.T.

With outspread arms of unequal length that extend far and away to sources remote from the parent stream, the River Darling drains the western and southern waters of the Great Dividing Range, from the head waters of the Lachlan to a place slightly north of the 25th parallel, where it is met by Buckland's Tableland. Here the watershed inclines in a somewhat irregular curve westerly and south-westerly, following the Warrego Range to a point north-east of Mt. Edinburgh, which marks its north-western limit. Within the periphery of this circumscribed region are included the waters of the Bogan, Macquarie, Castlereagh, Namoi, Gwyder, Macintyre, Weir, Moonie, Condamine, Mungallala, Maranoa, Warrego, and Paroo sources. The Warrego unites with the Darling about 65 miles below, and the others, except the last, about 10 miles above Bourke. Although included within the drainage area of the Darling, the Paroo terminates in swamps some twoscore miles north-west of Wilcannia; consequently its waters never reach the main stream, and it is only during exceptionally heavy floods that the latter receives any of the Warrego River waters. Including its longest tributary, the Culgoa or Condamine, whose source is in the western flank of Wilson's Peak (4032ft.), in the neighbourhood of Killarney, the total length of the Darling River is about 1953 miles to its junction with the Murray at Wentworth; thence to the sea through Lake Alexandrina for 587 miles. In his paper upon "The Rivers of the Interior of New South Wales," Mr. F. B. Gipps estimates the length of the Darling River at 1953 miles (17), and Mr. H. C. Russell states that it is 3282! (18). The discrepancy is certainly remarkable, and in the interests of correct geographical information it is here pointed out.

I have already drawn attention to the importance of the water supply of the Murray River system for irrigation purposes, and to the enormous extent of country within its basin that could be rendered highly productive by irrigation. This matter, I am happy to say, is now engaging the attention of the Government of New South Wales, where a Water Conservation Department has recently been established, and in a few years we may expect to see the beneficial results of this wise and enlightened policy everywhere apparent in the country west of the Dividing Range.

Along the southern and eastern continental seaboard are

numerous rivers, few of which are, however, of any great commercial importance as compared with those of other parts of the world.* In Victoria the Glenelg drains the western waters of the Grampians and those of the Victoria Range. From its source in the north-eastern spurs of the latter it flows westerly and southerly through a most devious channel for 205 miles, discharging its waters in Discovery Bay, near the western boundary of the colony. It drains an area of about 4500 square miles. At the south-eastern corner of the continent the Mitchell and Snowy rivers flow into the Pacific Ocean. The former rises in the southern face of the Great Dividing Range, emptying itself into Lake King, and the sources of the latter are within the colony of New South Wales in the lofty Kiandra ranges. The length of its channel is about 400 miles, and its drainage area some 5000 square miles. Next in point of geographical position and importance are the Hunter and Clarence rivers, north of Port Jackson. The former from its source in the Liverpool Range flows south and east for 200 miles to the port of Newcastle. It drains an exceedingly fertile basin of 7900 square miles of the finest pastoral and agricultural land in the whole colony, and large steamers and other vessels navigate its waters for a distance of some 35 miles, besides one or two of its tributaries, which are also navigable. The Clarence is certainly one of the finest streams of Eastern Australia, although the entrance is obstructed by a bar. From its source in the Obelisk Mountains to the sea in Shoal Bay it flows through a channel of 240 miles in length, draining a fertile valley of 8000 square miles. It is navigable from the sea up to Solferino for 136 miles. The district is famous for its mineral areas and for its rich agricultural and pastoral lands. The Brisbane, Fitzroy, and Burdekin rivers are such as to merit something more than mere passing notice. From a commercial standpoint the first, taken in order of position, is undoubtedly the most important stream with which we have to deal on the eastern coast of the continent. It rises in the most northerly extension of Cooyar Range, north of Mount Stanley, and flows

*As most of these streams are too insignificant to merit separate treatment here, reference will only be made to such as are of special importance; others will be enumerated in the schedules at the end of this Address for future reference.

in a general southerly and easterly direction through a very crooked channel for 210 miles to Moreton Bay. It combines with its own the united waters of the Stanley, Bremer, Cooyar and other tributary streams, by which it is so greatly augmented during periods of heavy rain that many of the low-lying areas within its basin are seriously flooded. It drains an area of 5300 square miles including that part of the East Moreton district bounded on the north-west by the Main and Cooyar ranges; on the south-east by the watershed of the Logan River; and on the north-east by the D'Aguilar Range. The flourishing and rapidly rising capital of the great northern colony of Queensland is situated on the banks of this river, about 15 miles from its mouth, to which place it is navigable for the largest steamers, and for small vessels as far up as Ipswich. The Fitzroy is a large and important stream 180 miles long with about twelve tributaries. It is navigable for large vessels for 40 miles to the town of Rockhampton, and drains an area of some 55,600 square miles of country. The Burdekin River is a large stream of 425 miles in length, draining an area of 55,529 square miles, whose tropical waters are discharged in the Pacific Ocean at Upstart Bay. It is not, however, navigable except for small vessels, a few miles only, and during heavy floods the channel is liable to undergo much alteration. The delta lands are exceedingly fertile, but the river itself is of little value for commercial purposes. The subsoil is porous and the surface soil very rich. The whole of the lower basin is eminently adapted for tropical agriculture and the areas of the delta are highly productive sugar lands, most of which are under cultivation and yielding remarkably heavy crops of cane of a high density. In times of heavy floods the low-lying lands are inundated by the overflow of the river waters, but the deposit of sediment left on the surface considerably increases the fertility of the soil. In the northern part of the continent there are several remarkably fine rivers, some of which are of considerable importance, especially the Victoria and Roper. The former is a splendid stream, the Murray of this side of the continent, disemboguing into the Indian Ocean, in latitude 14deg. 40min. S.; longitude, 129deg. 21min. E. Its mouth is 26 miles wide, the main entrance being Queen's Channel, through which it is navigable for the largest ships for

fully 50 miles from the sea, and for light draught river vessels some 60 miles farther, to a place where our veteran explorer (Hon. A. C. Gregory) at one time camped for several months. The river is easy to navigate, even by strangers, the principal channel being wide and deep, with few impediments. The Victoria drains an extensive tract of magnificent pastoral country of the richest quality, comprising an area of about 90,000 square miles; of this it has been observed by early travellers that there is a greater luxuriance of grass than had been met with in any other part of the world. The whole of the basin is abundantly watered by a copious tropical rainfall, and there are no elements of uncertainty in the climatic features of the region. In comparing this magnificent commercial highway with other famous streams of the world, Captain Carrington, who surveyed it in the Government steamer *Palmerston* in 1884, writes that, "in view" of "its capability as a harbour and its easiness of access," he has "no hesitation in saying that the Victoria is far superior to the Thames, Mersey or Hooghley" (19). No stream in the northern part of the continent is perhaps more widely and better known to early colonists than the Roper River; it has been oftener frequented than any of the other streams, especially at the time when the overland telegraph line was being constructed, the stores and material for the northern portion of which were landed there. It is a long river penetrating far into the interior and is navigable for vessels drawing from 10 to 12 feet for over 90 miles from the sea. Its waters are discharged into the south-west part of the Gulf of Carpentaria, in the immediate neighbourhood of Maria Island, the coast being at this place very flat, with a wide fringe of mangroves and extensive shallow patches of mud and sand. From the sources of its more distant tributaries, in the central portion of the Northern Territory, it flows almost due east to the sea. Besides these there are several other large and important northern streams, especially the Adelaide and Daly rivers. The former flows through a splendid pastoral country, luxuriantly grassed, and is navigable for 80 or 90 miles by vessels of 10 or 12 feet draught. It takes its rise in the neighbourhood of Pine Creek Railway Station, on the overland telegraph line, and discharges its waters into Adam Bay at Clarence Strait. The

latter stream may be navigated by river boats for some 60 miles from the sea into which its waters are discharged at Anson Bay. It is a long river with several widely expanding tributaries, and it traverses an extensive tract of country, including some fine agricultural and pastoral lands, and there are valuable copper mines near the navigable portion of its channel.

Owing to the absence of high mountain ranges, and on account of the peculiar physical structure of the country there are no rivers of importance in the western part of the continent. True there are some of the streams of from 300 to even 500 miles in length, such as the Fitzroy, Ashburton, Gascoyne, and Blackwood rivers—the first three flowing into the Indian Ocean, and the last into Flinders Bay. But these are only developed into true continental streams during periods of very heavy rains, when enormous volumes of water rush through their channels to the sea, sometimes overflowing the banks and flooding extensive areas of low-lying country. In dry seasons they are greatly diminished in size, the main channels being quite shallow and of little value as commercial highways. The Fitzroy drains an extensive tract of country, comprising considerably large areas of very fertile land. The Ord River is a large stream; its source is in the ravines of the Albert Edward Range, near the western edge of the Great Antrim Plateau and Denison Plains, in the neighbourhood of Kimberley; thence it flows almost due north to the shores of Cambridge Gulf, a short distance west of the mouth of the Victoria River. The country in the neighbourhood of the head waters of the Ord is very rugged and exceedingly difficult to travel. None of the rivers are navigable except the Swan for about 20 miles.

The whole coast line along the entire periphery of the Australian Bight is the most remarkable region with which we have to deal in this description of the river systems of the continent. There are no prominent or conspicuous physical features along this part of the coast line, and the geographer may look in vain for anything approaching a well defined stream of water. Nor is this at all singular when we glance at a general map of the country and see the enormous extent of level plains and desert areas by which it is chiefly characterised. Except a long narrow belt of sandstone cliffs with which the coast line is distinguished

there are no prominent features to relieve the eternal monotony of this dry and uninhabited region. The rainfall here is very light, uncertain and capricious, and falling on an intensely hot and loose sandy surface it evaporates with remarkable rapidity before soaking any great depth into the soil. For this reason there is an almost entire absence of surface water, and consequently nothing to form or maintain running streams.

Most of the so-called rivers of South Australia are torrents in winter, but mere creeks or successions of waterholes in summer. In the settled portions of the province many of them take a westerly course to St. Vincent and Spencer gulfs, and a few by a southerly course empty themselves into Encounter Bay, and have their sources in ranges trending in a northerly direction. In the northern portion Lake Eyre, an enormous basin below sea level, receives the surplus water brought down from the east by the Cooper or Barcoo ; from the north-east by the Warburton and Diamentina ; from the north-west and west by the Macumba and Neals respectively ; and from the south by the Frome. All these large watercourses are filled to their utmost capacity during wet seasons, but in dry years they have only a little permanent water in them.

Lakes.—Most of the so-called lakes of Australia are insignificant depressions filled with the storm waters of widely expanding river channels during heavy rains. In the central regions these are spread out over extensive shallow basins, usually surrounded by a thick deposit of mud, whose surface is characterised by a hard and treacherous saline crust. Located in vast, rainless saltbush country, where the heat is intense, the flood waters evaporate with astonishing rapidity, and for most part of the year these lakes are simply enormous mud basins where salt is deposited in large quantities. During the rainy season they are again filled by the flood waters of inland rivers. The largest are lakes Eyre, Amadeus, Gardiner, Torrens, Frome, and Gregory, all more or less salt. The configuration of the continent is not favourable to the formation or existence of large natural reservoirs for the storage of permanent fresh water in the inland regions, such as are to be found in New Zealand and other countries where deep lake basins occur in mountain region and on high tablelands. Formed as Australia is, like the inverted

half of a gigantic bivalve, with the eastern part high and dipping more rapidly towards the centre than the western half, which gradually and imperceptibly slopes inwards, most of the inland basin is flat, the soil and upper stratum highly absorbent; while the lower portion of the bed in several parts is not much, if indeed at all, above sea level. For this reason, and in view of the general physical structure of the continent as a whole, I regard the theory of subterranean channels, through which it is believed that large volumes of rain water find their way to the sea, as altogether erroneous. No leakage of sufficient magnitude to compensate for the somewhat rapid disappearance of the flood-waters of some of our inland rivers, in my opinion, exists, and the convenient supposition, for such it really is, that the few and insignificant submarine springs between Cape Otway and the mouth of the Murray River are indicative of such, arises more from a preternaturally excited imagination than from a just conception of the fundamental law of hydrology. Several so-called leakages no doubt occur along some parts of the coast line, oozing through the porous strata or in the form of bubbling springs, such as may be met with along the shores of most of the Pacific islands, but the necessary evidence to sustain the theory that large volumes of fresh water are discharged into the ocean through subterranean channels is not at present available.

Flood waters are usually highly charged with sediment that is held more or less in suspension while they pass through channels of steep declivity, but which is rapidly deposited over areas where the minimum velocity occurs. The primary effect of deposition is experienced in the rapid or gradual silting up of water channels, and consequent diminution in their carrying capacity. Viewed in this light, it seems to me improbable that any system of subterranean channels could always remain effective along comparatively low levels. Against this opinion it may be stated that the flood waters filter through the upper strata and are thus freed from sediment before the lower levels are reached. But this is not by any means conclusive, for the efficiency of filter beds is liable to become impaired or altogether ineffective by heavy deposition of sediment and superincumbent or internal pressure. As previously remarked, the central basin of

our continent is characterised by an almost uniformly low depression, in places actually below sea-level, over which the flood waters of our inland rivers spread out in immense shallow sheets, but through which it is scarcely possible they can gravitate to the sea in opposition to the local hydrographical conditions. Throughout these central catchment areas an absolute deposition of sediment occurs and most of the waters rapidly disappear by the simple process of evaporation. On higher levels, where the waters pass over or are collected on highly absorbent cretaceous beds, some are retained from which our artesian supplies are probably derived; but even here a very large percentage is lost by evaporation, which, in my opinion, is of itself sufficient to compensate for the speedy drying-up of shallow waterholes and river beds.

Along the eastern seaboard there are several natural reservoirs of fresh water, such as lakes George and Bathurst and other smaller basins, inappropriately called lakes, but which in reality are merely lagoons. These are, however, comparatively shallow —even the largest has been known to be quite dry in times of severe and protracted droughts. The most remarkable and at the same time unique of all the Australian lakes is that which occurs in the alpine regions of Gippsland. Situated in one of the recesses of a lofty range culminating in Mount Wellington, 5000ft. above sea level, is a beautiful lakelet known by the native name of Tali-karng, whose height above sea level is about 3000ft. Mr. A. W. Howitt, who examined it in 1890 (20), concluded that the basin of the lakelet has been formed by an accumulation of rock fragments that fills the valley of Nigothoruk Creek, and thus dams up the water, which does not overflow the embankment, even in times of flood. It is about 100ft. in depth in the deepest part; the surface is pear-shaped and it covers an area estimated at about 26 acres.

Climate.—The potent influence of climate upon the inhabitants of a country as well as upon its natural and artificial resources renders its consideration essential in dealing with the subject of physical geography. Notwithstanding the rapid development of Australian meteorology during recent years, resulting chiefly from the widely scattered ramifications of the Queensland Weather Office, under the enthusiastic direction of Mr. Clement

Wragge, the climate of our country as a whole has not yet been satisfactorily elucidated, although the older established offices at Sydney, Melbourne, and Adelaide have, for many years, given much attention to the subject. Thanks to the enlightened policy of the Queensland Government much indeed has been done in recording atmospheric phenomena at numerous stations spread out over an enormously wide field, extending even outside of what is usually considered the geographical limits of Australasia proper. But no fundamental law has yet been established, by which the meteorologist can foretell any remarkable seasonal changes, by which our pastoral and agricultural industries are so largely influenced, nor yet indeed has any satisfactory explanation been given of the probable cause of protracted droughts, or seasons of maximum rainfall. Meteorology, it is true, is yet in its infancy in this part of the world at least, and if an elucidation of our climatic changes is to depend upon an accumulation of recorded data, rather than upon abstract scientific principles based upon deductive premises, then a generation of observers must pass away before we can hope for any satisfactory results. In this connection an interesting and vitally important subject awaits consideration. I refer to the influence of our Australian climate upon the European inhabitants of the country, and more especially upon the native-born Anglo-Australian. In this land a distinct Austral branch of the race has been planted, and nothing can be more interesting than to note the extent of climatic influence upon the physique and natural characteristics of that race. The geographical position of Australia places it within the influence of two powerful atmospheric zones of unequal temperature. Two-thirds if not the whole of the continent is more or less affected by the widely circulating equatorial air currents that frequently sweep down upon our shores with rapidly developing energy across the Indian Ocean. These strike our seaboard with enormous cyclonic force, carrying with them great dense masses of vapour clouds that condense and empty themselves in the form of heavy precipitations, which cause abnormal floods over the low-lying face of the country. As it is natural to suppose, the northern or tropical division of Australia is more largely influenced by these equatorial disturbances than the other portion, although at times

their extreme southern limit reaches a high parallel of latitude. On the other hand we are sometimes, although less frequently, visited by the cold antarctic disturbances that overlap extensive southern areas of our country. That the climate of this part of the continent is influenced by the South Polar air and ocean currents there cannot, I submit, be the slightest doubt, and an exhaustive investigation of this subject is of the most vital importance to science and commerce. Towards the solution of this interesting problem much will doubtless be done by a more extended acquaintance with the antarctic regions when further exploration of far southern latitudes is accomplished. The presence of enormous masses of Polar ice in Australian waters in close proximity to the shore is not by any means an uncommon occurrence, and when it is considered how comparatively narrow the belt is that separates us from the actual northern limit of the Antarctic ice drift, we will probably admit that there is some affinity between our own climate and that of far southern lands. There is also a probability that the recently discovered traces of so-called glaciation in our own country is not an indication of a true glacial period at all, but simply isolated fragments of southern ice masses which, having drifted far away into northern regions when there were much smaller and fewer land areas to impede the circulation of Antarctic Ocean currents, stranded on the southern shores of a partially submerged continent during a period of rapid evolution, when the predominant physical conditions would favour the preservation of traces for ages. Be this as it may, the significant fact remains that the only traces discovered have been found in the extreme southern portion of our continent and on the neighbouring island of Tasmania—a circumstance which, in my opinion, strongly favours the theory of ice-drift. The great extent of our continent and compactness of its land mass invest it with a very wide range of climate. There are three distinct and primary zones—tropical, sub-tropical, and temperate, and these may be subdivided into local divisions, representing the climates of our seaboard, the mountains, tablelands, and the great central desert area. On the whole the tropical climate of Australia is not by any means unhealthy to Europeans. On some of the low-lying coastal areas in the

immediate neighbourhood of swampy and marshy lands malarial fever is readily contracted by people who are not acclimatised, and by those who rashly expose themselves. The subject is a difficult one with which to deal; so many contributing causes have to be considered—physical condition, food, clothing, mode of life, and other predisposing factors require special elucidation before the extent of absolute climatic influence can be properly estimated. Individual opinion, and indeed individual experience, is not by any means a satisfactory guide in investigating this subject, for men's opinions like their physical conditions rarely harmonise. Mr. E. A. Leonard, who spent some time in the Cardwell district land surveying, says: "The climate is very trying to white men, who must rapidly deteriorate in physique should they live there continuously" (21). There are many people who concur in this opinion. On the other hand Mr. A. Meston, who has had a long experience in widely different parts of the country, and who gives an interesting chapter upon the subject in his recently published valuable work, regards the tropical climate of North-eastern Australia in the most favourable light, maintaining that it is exceptionally healthy to Europeans. Unjustifiable prejudice has much to do in a case of this kind, but taking all things into consideration I am inclined to believe that continuous domicile in *any* tropical climate is not favourable to perfect health, viewed from an Anglo-Saxon standpoint; and this is especially so in the case of females. There are certainly periods of uncomfortable inertia that seem to insinuate themselves even upon those who are physically healthy, and these have a tendency to increase rather than diminish. Many of the old troubles associated with early pioneer colonisation have partially or almost wholly disappeared with the advance of settlement, and many localities that were formerly considered unhealthy are not so now, and Europeans of temperate habit can live in tropical Australia in the enjoyment of very good health with little discomfort. It should, however, be borne in mind that a tropical climate is never salubrious, except on elevated positions.

Within the temperate zone the climate varies greatly with the latitude and it is, moreover, governed very much by extent of elevation and other local configuration of physical conditions.

In the southern and south-eastern portion of the continent the climate is cool and remarkably healthy throughout the year, except two or three months of the summer when the temperature is abnormally high and hot winds more or less prevalent. Along the seaboard of this division the atmosphere is rarely free from moisture and this element of discomfort is experienced more keenly on the low-lying and deltaic lands of river valleys, where the alluvial soils absorb and retain a larger percentage of the rainfall than on the neighbouring undulating tracts of country, where a good natural drainage exists. On the tablelands of the New England, Monaro, and other districts, the climate is at all times salubrious; and in the upland mountain regions of the Southern Alpine chain, the Blue Mountains, and Liverpool Range, the cold is acutely felt in winter, and during the summer months the atmosphere is sharp and bracing. In the great central basin of the continent the atmosphere is dry and intensely hot; there is little or no rainfall, and most of that part of the country is a vast arid desert, altogether uninhabitable. The western plains of New South Wales are remarkably fertile for grazing purposes, notwithstanding the scanty rainfall, and with a good supply of artesian water the soil is eminently suitable for agriculture. The Riverina climate is famous for its healthfulness, especially for those with weak chests, the atmosphere being exceedingly dry and the temperature uniformly high. In Queensland the Darling Downs and western districts possess the finest climate of Australia. For consumptives and those with weak respiratory organs it is unequalled anywhere, and there are numerous instances on record of cures having been effected in this part of the country where cases were considered hopeless. In summer the atmosphere is extremely dry and hot, but never oppressive; the winter months are delightfully cool and bracing—light frosts sometimes occurring, but never severe nor of long duration. The climate here is in all respects on a parallel with that of Italy. For some unaccountable reason, most probably arising from prejudice and ignorance combined, the climate of the East Moreton district is often supposed to be uncomfortably hot and enervating. That such is not the case may easily be proved by reference to the records of the Chief Weather Bureau and to the

vital statistics of this part of the colony. The three or four summer months are naturally hot, but there are no sudden changes at any time; there is a remarkable uniformity of temperature; the nights are comparatively cool, and hot winds entirely unknown. In winter the weather is most delightful, the climate then being even superior to that of Naples; beautifully clear sky and dry atmosphere are the ruling climatic features of this season of the year in South-eastern Queensland. The only slight discomfort felt is during the westerly winds, which are seldom of longer duration than three days. From the early days of settlement on the shores of Moreton Bay the climate of the district has always been considered exceptionally healthy. In "The Geographic History of Queensland" the author quotes an interesting extract bearing upon this subject from a report written in 1845 by Dr. Keith Ballow to the Rev. Dr. Lang. Dr. Ballow, who had spent some eight years in Moreton Bay as Government Medical Officer, says:—"The district of Moreton Bay is altogether an extremely healthy one, there being only a few deaths from disease of any kind. The climate in the winter season is one of the finest in the world. This district is not a profitable field for doctors" (22). This seems to be the general verdict of those who are qualified to express an opinion upon the subject. The most important factor of our Australian climate is that of rainfall. Land without an adequate rainfall is useless for either pastoral or agricultural purposes, unless artificially watered by irrigation. Although the total area of the continent is about 2,944,628 square miles a vast portion of that area has an annual rainfall of less than ten inches, and consequently it is of little or no value whatever in its present state. This is notably the case with the great central depression where immense areas of waterless desert country obtain. Considering its compactness and wide climatic range the rainfall of Australia is very unequally distributed over the whole of the territory, even in places where there is a regular wet and dry season. A glance at the rainfall map will readily show that this is indeed very marked along the eastern Pacific slope where the greatest pluvial measures have been recorded. The Cardwell and Mackay districts top the score, the former with an average annual rainfall of some 150 inches: Arnhem's Land follows

with about 63 inches; the Australian Alps, the Tweed and Mary rivers come next, each with 50 inches. These isolated and somewhat limited areas are, however, distributed over a wide geographic range, extending from the most northern to the southern limits of the continent, and they are separated by extensive tracts of country or climatic zones, over which the average annual rainfall is not greater than 30 inches. In the Cardwell and Mackay districts, which lie wholly within the tropical rain belt, the former between the parallels of 15 and 20 degrees, the isopluvoise lines of 40 to 70 inches are very closely packed together, so that the heavy rains in these zones seldom extend beyond the coast range, but are mostly precipitated over the deltaic lands of the river and valleys, and on the Pacific slope of the Dividing Range. In these districts there is a regular wet and dry season—the former occurring in the months of December, January and February, when the atmosphere is heavily laden with moisture, and the shade temperature, of from 80 to 90 degrees, exceedingly oppressive. During this period there is a prevailing north-east wind, which changes to south-east and continues in that quarter throughout the remaining nine months of the year. In the Cardwell district the tropical scrubs sometimes ascend the ranges to a height of over 2,000 feet, where the temperature is lower than that to which they properly belong, but such cases only occur where the volcanic soils are exceptionally rich. In Arnhem's Land, or all that high tableland portion of the Northern Territory of South Australia, north of the 16th parallel, the annual rainfall averages about 60 inches and is more equally and generally distributed than in any other part of the continent; the climate is, of course, tropical, but the mornings and evenings are generally cool, and the usual discomforts of the moist atmosphere of the low-lying eastern and northern coast lands are not felt here on the dry upland zone of the plateau. A remarkable feature of the prevailing Australian climate is found in the rapidly diminished rainfall after crossing the Great Dividing Range of the southern and eastern cordillera. There is an immense belt of country comprising the western plains of New South Wales and Queensland; Cape York Peninsula; the whole of the country bordering upon and extending far south from the

head of the Gulf of Carpentaria; most of the southern portion of the Northern territory of South Australia and the Glenelg and Kimberly districts of the western portion of the continent, where the average annual rainfall does not exceed from 10 to 30 inches. Except in the extreme south-west corner of Australia, where the isopluvoise lines of 20 and 30 inches are fairly well established, the rainfall of the western division is very scanty, being limited to a narrow belt along the seaboard, where it only averages from 10 to 20 inches. In the Murchison and Gascoyne districts extremely heavy dews occur, which, no doubt, compensate to some extent for the lack of an adequate rainfall. In the northern part of Western Australia the wet season commences in December and usually ends in March, and it is during this period the destructive cyclonic storms are experienced. These are of the true equatorial type and move along with enormous velocity, often causing great destruction to property, and not unfrequently loss of life. The wet season of the southern district is from April till October, during which time most of the annual rainfall is recorded. The climate here is temperate and in every respect congenial to Europeans; fruits and agricultural produce are plentiful, and the forests yield an abundance of very valuable timbers. In the Kimberly district the heat of the summer months is intense, but during the cool season the climate is agreeable. In some of the northern districts the temperature, although very high, is not by any means inimical to health, as the atmosphere is remarkably free from moisture and the heat less oppressive than in other parts where the humidity is great and the thermometer lower. On the tablelands of the interior of this part of the country the climate during the greater portion of the year is delightful, but of the far eastern or central districts little is known beyond mere report, which in most cases is unreliable.

South Australia is not by any means an abundantly watered colony, the rainfall being probably less than in any other part of the continent. In the neighbourhood of Adelaide there is some 20 to 30 inches annually, the average record being about 22 inches only, in the wettest districts; while the country occupied by the Flinders Range, Eyre's Peninsula, and that along the shores of Spencer's Gulf enjoys but a scanty rainfall of little

more than from 10 to 20 inches annually. In this country, too, the excessive heat and persistent droughts are keenly felt during the summer months of the year. Augmented by the heat from the sandy desert plains of the interior the atmosphere is sometimes oppressive and hot winds very trying both to animal life and vegetation. From these, which usually occur in the months of December, January and February, there is absolutely no escape, the temperature being abnormally high and not infrequently the thermometer rises 110 to 115 degrees Fah. in the shade. Luckily these only occur during three months of the year, the winter season being mild and agreeable.

Some interesting and useful information might be given concerning the pastoral and agricultural resources of our continent did time and space permit. In both respects I have, I fear, already exceeded reasonable limit; I will, therefore, merely offer a few remarks which, if they do nothing more, may call attention to these vitally important subjects. A good pastoral country requires an adequate water supply, either derived from rainfall or from artesian sources. The former is natural, inexpensive, and permanent: the latter costly and limited. The wants of the pastoralist and agriculturist are unequal, although both are equally dependent upon the products of the soil. Grass, or any other form of vegetation, can only grow in soil where there is sufficient moisture to sustain it and this necessary want can only be supplied, naturally, by rainfall. The more uniformly it is distributed throughout the year the better will the country be for pastoral occupation. On the other hand the agriculturist requires sufficient rainfall during six months of the year, but his crops of grain and his vines would be little affected if the other six months were rainless. But too much rain is injurious to grain crops, for while it requires more than 20 inches of rainfall in the summer for maize, such a climate would be unsuitable for the successful cultivation of wheat. To the agriculturist nothing is more important than climate, and reliable information upon this vital subject is essential to the successful cultivation of the soil, both here and elsewhere. Although Australia is pre-eminently a grazing country there are nevertheless extensive agricultural areas where grain crops may be profitably raised. In the eastern part especially there is a long belt stretching northerly from Jervis Bay along the coast to Broad-

sound, where the rainfall is more than 20 inches during the summer months, which is there the rainy season. Here there is an extensive climatic zone, lying between the 22nd and 35th parallels, favourable to the cultivation of maize. Outside of this region, including all the coastal country from Adelaide north to Toowoomba, the rainfall is more than 10 inches during the six winter months, which represent the agricultural season there. These are simply the *natural* agricultural regions in eastern extra-tropical Australia, or that part of our territory where the climate is favourable to the cultivation of maize and wheat. In many other districts there are enormous areas of rich soil whose highly productive qualities could be profitably utilised by irrigation were adequate means provided for the conservation of water. But this is a subject upon which little attention has hitherto been bestowed, although it is of the most vital importance to the nation and one which cannot be much longer neglected if the resources of our country are to be adequately developed.

In this address I have attempted to give as concise and, at the same time, comprehensive an account of the physical geography of our continent as it is possible for me to do under the circumstances. The subject is a vast one with which to deal in any form, and the smallest of our colonies could easily have furnished abundant material without exhausting the rich source of supply. Its chief merit is that it is based upon the most recent information, derived from official sources, and in this respect it is reliable and trustworthy, the writer having aimed at these rather than mere literary style, or elegance of diction. Appended is a selection of what will no doubt be considered useful information, but which could not be conveniently included in the narrative portion of this address without making it unnecessarily ponderous. It consists of schedules of our principal rivers and mountains; the lengths, drainage areas, etc., of the former, and heights of the latter. The preparation of these has entailed a great deal of labour, but it was thought that the data would be useful for educational purposes and serviceable to my successors, who will thus be supplied with available information to enable them to follow up this interesting and vitally important subject.

In conclusion I desire to acknowledge my obligations to the

Honourable A. R. Richardson, M.L.A., Commissioner of Crown Lands, Western Australia; to Mr. William Houston, Under Secretary for Lands, Sydney, and to Mr. William Strawbridge, Surveyor-General of South Australia, for valuable information specially prepared by them for this address.

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Schedule of the Principal Rivers of South and Eastern Australia; their Lengths and Drainage Areas.*

Name of River.	Length in Miles.	Locality of Outlet.	Principal Tributaries.	Total Drainage Area in Sq. Miles.	How Far Navigable.	Volume Discharged in Gallons per Annum.	Remarks.
Murray	†1700	Encounter Bay	Darling (with its tributaries the Culgoa Warrego, Macquarie, Namoi, Bogan, Gwyder, and Macintyre), Murrumbidgee, Lachlan, Indi, Mitta Mitta, Ovens, Goulburn, &c.	414,253	To Albury and to Walgett on the Darling	3,000,000,000,000 average gauging for 3 years, 1884, '87, '89	Being 10% of the average rainfall of 10.5 inches upon a total catchment of 250,410 square miles varying from 225,000,000,000 to 732,000,000,000 cubic feet per annum.
Onkaparinga ..	60	Gulf St. Vincent	Cox's, Biggs', Dashwoods, Carey's, Scott's Creeks, &c.	170	4 miles	19,000,000,000 average gauging for 2 years	Being 5.7 to 31% of rainfall, 27.6 to 44.6 inches per annum, varying from 4,000,000,000 to 34,000,000,000 gallons per annum.
Sturt	17	,,	Watts, Minno, Karka, &c.	10	Not navigable	Not known	Perennial, fresh; small supply in summer.
Torrens	50	,,	Kangaroo, Brown Hill, Cudlee, 1st, 2nd, 3rd, 4th, 5th, 6th creeks	125	..	11,000,000,000 average gauging for 2 years	Being 4.5 to 23% of rainfall, 23.1 and 11.5 inches per annum, varying from 2,000,000,000 to 20,000,000,000 gallons per annum.
Little Para ..	20	,,	Gould's Creek, &c.	50	..	Not known	Dry, or nearly so towards the end of summer.
Gawler, or Great Para	80	,,	South Para, Jacob's, Victoria, Malcolm's Walker's, Salt, Greenock, &c.	400	..	..	R. Gawler not gauged; discharge from South Para and Victoria Creek is from 1,000,000,000 to 13,000,000,000 gallons per annum, being 4 to 27% of rainfall, 21 and 37.5 inches per annum
Light	100	,,	Julia, Gilbert, Tothill's Spring, St. Kitts, &c.	600	..	..	Perennial, fresh; small flow during summer; overflows near the Gulf with storm water from hills in winter.
Wakefield.. ..	65	,,	Skilligolee, Pine, &c.	400	Half-mile	..	Perennial, fresh; small flow during summer; considerable volume in winter.

* Compiled from official sources. † Total length from the head of the Condamine, the most remote source of the Darling River, to the sea is 2540 miles.

SCHEDULE OF THE PRINCIPAL RIVERS OF SOUTH AND EASTERN AUSTRALIA.—*Continued.*

Name of River.	Length in Miles.	Locality o Outlet.	Principal Tributaries.	Total Drainage Area in Sq. Miles.	How Far Navigable.	Volume Discharged in Gallons per Annum.	Remarks.
BROUGHTON	93	Spencer's Gulf	Rocky River, Crystal Brook, Hill, Hutt, Yackamoorundie, Bundaleer, &c.	2000	Not navigable	Not known	Fresh and perennial for about half its length; remainder brackish and intermittent during summer; large volume during winter.
TOD	26	"	Various watercourses	100	"	Not known	Perennial, fresh; small supply in summer.
HINDMARSH	15	Encounter Bay	Various watercourses	10	2 miles	Not known	Perennial, fresh; small supply in summer.
INMAN	17	"	Back Valley, Duck Nest, &c.	75	1 mile	Not known	Perennial, fresh; small supply in summer.
GLENELG	281 app'x.	Discovery Bay	Various watercourses	4500 approx.	?	Not known	Several beautiful waterfalls occur on the tributary streams of this river.
HOPKINS	155 app'x.	Warrnambool	Various watercourses	?	?	?	
YARRA YARRA ..	150 app'x.	Hobson's Bay, Port Phillip	Various watercourses	?	?	?	Flows through the City of Melbourne
SNOWY	300 app'x.	W. of Cape Conran, S. Pacific Ocean	Various watercourses	5000 approx.	?	?	Frequently flooded; its head waters are situated in the high and rugged Muniong Range in N.S.W.
TOWAMBA	40	Twofold Bay	Various watercourses	?	?	?	Rises in the eastern face of the coast range.
BEGA	60	Tathra	Various watercourses	500 approx.	A few miles	?	Rises in the eastern face of the coast range.
TUROSS	?	S. of the 36th parallel of latitude, S. Pacific Ocean	Various watercourses	600 approx.	?	?	Source lies in the Barren Jumbo Mt.; enters the sea through a wide channel.
MORUYA	80	Town of Moruya, N. of the 36th parallel of latitude, S. Pacific Ocean	Various watercourses	350	A short distance	?	Natural outlet for the districts of Araluen and Braidwood; mineral country; gold-bearing quartz and silver ore occur in the basin of the river, and fish and oysters are plentiful in the stream.
CLYDE	70	Bateman's Bay	Various watercourses	450	?	?	Has its source in the Pigeon House Mt.; part flows through auriferous country.

Schedule of the Principal Rivers of South and Eastern Australia.—*Continued.*

Name of River.	Length in Miles.	Locality of Outlet.	Principal Tributaries.	Total Drainage Area in Sq. Miles.	How Far Navigable.	Volume Discharged in Gallons per Annum.	Remarks.
Shoalhaven	260	Greenwell Point	Various watercourses	3300	12 miles	?	Source in Corombars Swamp, elevation 2800 ft.; flows through rugged, mountainous, auriferous country.
Hawkesbury	330	Broken Bay	Cowpasture, Grose, Cox rivers, &c.	8710	140 miles to Windsor	?	Source in the Cullarin Range; flows through a valley famous for its beautiful scenery, and discharges into a splendid harbour.
Hunter	200	Newcastle	Williams and Paterson rivers, &c.	7900	35 miles	?	Source lies in the Liverpool Range; passes through a district famous for its extensive coal mines.
Karuah	15	Port Stephens	Various watercourses	600	For some distance	?	The Harbour of Port Stephens is one of the finest in the eastern coast of Australia.
Manning	100	Mitchell Island	Bernard, Gloucester, &c.	3000	20 miles	?	Source located in the Main Range, near town of Nundle; valuable timber district.
Hastings	70	Port Macquarie	Various watercourses	1400	?	?	Flows through valuable timber district.
Macleay	200	Trial Bay	Apsley, Gyra, &c.	4800	30 miles	?	Grand waterfalls and magnificent scenery; source lies in the tableland near Ben Lomond; channel in many places cut deep in hard sandstone.
Clarence	240	Shoal Bay	Mitchell, Orara, &c.	8000	136 miles	?	Rises in a forest-clad range near the Obelisk Mountains; town of Grafton situated on its banks, 45 miles from the sea.
Richmond	120	Ballina Head	South Richmond, North Richmond, &c.	2400	19 miles in one branch and 65 in another	?	Source located between the southern spurs of Mt. Lindesay (4064 ft. high), being the culminating peak of Macpherson's Range; the river valley is famous for its valuable timbers.
Tweed	30	Point Danger	—	?	A few miles	?	Source lies at the base of Mt. Warning, a prominent peak 3353 ft. above sea level; entrance is obstructed by a bar.
Logan	65	Moreton Bay	Albert, Teviot Brook, Canungra, Burnett, Knapp creeks	1180	20 miles for small craft	?	Passes through a rich agricultural district.

SCHEDULE OF THE PRINCIPAL RIVERS OF SOUTH AND EASTERN AUSTRALIA.—*Continued.*

Name of River.	Length in Miles.	Locality of Outlet.	Principal Tributaries.	Total Drainage Area in Sq. Miles.	How Far Navigable.	Volume Discharged in Gallons per Annum.	Remarks.
BRISBANE	210	Moreton Bay	Stanley, Bremer, Emu, Lockyer, Cressbrook, Cooyar, Neurum cks.	5300	50 miles	?	Pile lighthouse at entrance; navigable for large vessels to City of Brisbane, 15 miles from mouth; spanned by two magnificent iron bridges at city and suburb of Indooroopilly.
MARY	160	Hervey Bay	Munna, Tinana, Yabba, Wide Bay, Obi Obi creeks	3900	40 miles	?	Town of Maryborough situated on its banks, to which it is navigable for large vessels.
BURNETT	200	Burnett Head	Boyne, Stuart, Rawbelle, Auburn, Perry, Splinters, Barambah, Birds' Eye, Degilbo creeks	13,388	10 miles for vessels of 300 tons	?	Town of Bundaberg situated on its banks; sandbars interrupt navigation about 10 miles from mouth.
KOLAN	92	N. of Burnett Head	Gin Gin Creek	1100	A short distance for small vessels	?	Rises in southern slopes of Dawes Range.
BOYNE	48	Port Curtis	Eastern Boyne, Futters and Degalgil creeks	3379	A few miles for small vessels	?	Rises in northern slopes of Dawes Range.
FITZROY .. .	180	Keppel Bay	Dawson, MacKenzie, Nogoa, Isaacs, Comet, Dee, Brown, Connors, Funnel, Theresa, Meteor, Consuelo creeks	55,603	70 miles	?	Navigable for large vessels 40 miles to town of Rockhampton, and 30 miles above that for small vessels.
BURDEKIN	425	Upstart Bay	Belyando, Suttor, Cape, Bowen, Basalt, Clarke, Bogie, Star, Composite, Mistake, Logan, Native Companion, Lolworthy creeks	53,529	A few miles for small vessels	?	The rich delta lands are liable to floods, and the channel of the river to much alteration.
HERBERT	128	Hinchinbrook Channel	Wild and Stone rivers and Rudd Creek	3328	A few miles for small vessels	?	Rises in the Herberton tableland; flows past the town of Ingham.
JOHNSTONE	18	Gladys Inlet	South Branch	844	10 miles	?	Passes through a district famous for tropical scrubs; the town of Geraldton is situated at the junction of the two branches of the river.
RUSSELL	16	Palmer Point	Mulgrave River	460	A few miles for small vessels	?	Drains the southern, eastern and northern waters of the Bellenden-Ker Range, which is situated between the two arms of the river.

SCHEDULE OF THE PRINCIPAL RIVERS OF SOUTH AND EASTERN AUSTRALIA.—*Continued.*

Name of River.	Length in Miles.	Locality of Outlet.	Principal Tributaries.	Total Drainage Area in Sq. Miles.	How Far Navigable.	Volume Discharged in Gallons per Annum.	Remarks.
BARRON	70	Trinity Bay	Granite, Clohesy, Tinaroo, Freshwater cks.	1093	For small craft for about 11 miles	?	Drains the waters west of the Bellenden-Ker Range; the river is famous for its magnificent waterfall, nowhere equalled in the Southern Hemisphere; the tropical scenery along its banks is of a grand description; the scrub lands of the district are rich and fertile.
DAINTREE	36	South of Cape Tribulation		440	A few miles for small vessels	?	Passes through the northern part of the Port Douglas district.
JARDINE	84	Endeavour Strait		921	?	?	The most northerly river in Australia.
BATAVIA	140	Port Musgrave, Gulf of Carpentaria	Ducie, Dalhunty	1843	For some distance	?	Port Musgrave is a capacious and well sheltered anchorage; source in central range of Cape York Peninsula.
COEN	48	Gulf of Carpentaria	—	1152	?	?	Source in central range of Cape York Peninsula.
ARCHER	170	"		5785	For some distance for small craft	?	Source in central range of Cape York Peninsula.
MITCHELL	300	"	Lynd, Palmer, Tate, Walsh, Hodgkinson	21,140	?	?	Source is only a few miles west of Port Douglas on the east coast of the peninsula.
GILBERT	256	"	Einasleigh, Etheridge, Copperfield	2073	?	?	Rises in the western slopes of the Great Dividing Range, west of Cardwell.
NORMAN	190	"	Carron, Macrossan and Walker's; Yappar, Clarina, Spear, Clara creeks	6000	30 miles	?	The town of Normanton is 30 miles from its mouth.
FLINDERS AND BYNOE	500	"	Saxby, Sutton, Cloncurry, McKinlay, Fullarton, Williams, Gilliatt, Stawell, Woolgar, O'Connell, Dismal creeks	47,078	?	?	Source is north-east of the town of Hughenden.
LEICHHARDT ..	216	"	Landsborough, Gunpowder, and Fiery cks.	13,158	?	?	
GREGORY	160	"	Nicholson, O'Shanassy, Thornton	13,977	?	?	
ALBERT	40	"	Barklay	?	To Burketown	?	

Schedule of the Principal Inland Rivers of Australia; their Lengths and Drainage Areas.*

Name of River.	Length in Miles.	Locality of Outlet.	Principal Tributaries.	Total Drainage Area in Sq. Miles.	How Far Navigable.	Remarks.
WILLOCHRA	110	Lake Torrens	Booleunda, Wirreanda, Coonatto, Mt. Arden, Booleroo, &c.	2000 approx.	Not navigable	Dry in summer, except waterholes; during winter overflows two miles wide in places.
PASMORE	100	Lake Frome	Siccus, Wilpena, Mattawarrangala, &c.	1700 approx	Not navigable	Dry in summer for greater part of its length; outlet for storm waters from high country, comprising Wi pena, Chace and other ranges.
FROME	150	Lake Eyre	Leigh's, Mundy, Boorloo, Burr, &c.	2000 approx.	Not navigable	Dry in summer, except a few waterholes; outlet for storm waters from north-west portion of Flinders Range.
CLAYTON	56	Lake Eyre	Various watercourses	500 approx.	Not navigable	Dry during considerable intervals.
COOPER, OR BARCOO	540	Lake Eyre	Thomson, Strzelecki Creek, Wilson, Darr, Alice, Kyabra, Landsborough creeks, &c.	97,000 approx.	Not navigable	The waters of the Cooper are collected in Central Queensland by the Thomson and Victoria rivers; its channel is occasionally almost dry, but in time of flood it overflows and spreads over a large tract of country.
WARBURTON ..	275	Lake Eyre	Everard, Diamentina, Kallakoopah, Derwent	3000 approx.	Not navigable	Outlet for the flood waters of the Mulligan, Hay, Field, Diamentina, Herbert, James, and Georgina rivers of Queensland and Northern Territory of South Australia.
TUER, OR MACUMBA	115	Lake Eyre	Stephenson, Hamilton, Alberga, Frew, Lindsay, &c.	10,000 approx.	Not navigable	A broad shallow channel draining tablelands north-west of Lake Eyre; also the Mabel, Hawdon, Emery, and Anthony ranges; in wet seasons overflows several miles in width for considerable distances; sometimes dry for periods of several years.
NEALES	200	Lake Eyre	Peake, Arckaringa, Lora, Wintinna, &c.	10,000 approx.	Not navigable	A broad shallow channel conveying drainage of Denison and Hanson ranges, and high country in direction of Everard and Musgrave ranges.
BULLOO	350	Bulloo Lake and Carryapundy Swamp	Blackwater Creek		Not navigable	Drains the eastern waters of the Gray Range in Queensland and terminates in Bulloo Lake (a few miles east of the 142nd meridian and north of the 29th parallel), and a series of swamps and saltbush plains farther south and east of it.
PAROO	310 approx.	Lakes and swamps north of Wilcannia	—		Not navigable	Waters are entirely absorbed in the interior and never reach the Darling, although they overflow but a few miles north of that river.

* Compiled from official sources.

SCHEDULE OF PRINCIPAL MOUNTAINS, &c., IN EASTERN AUSTRALIA, AND THEIR HEIGHTS (1). [N.S.W.] *

Name.	Height in Feet.	Name.	Height in Feet.	Name.	Height in Feet.
Ahern	3474	Chapman	2204	Greenwood	2866
Ainslie	2762	Chaton	2953	Grose	1499
Allianoyonyiga	3327	Chatsbury	2809	Guise	2500
Amungula	3000	Cleft	2443	Gundary	2767
Auburn (Northd.)	1201	Coffin Rock	1424	Gunyah	2624
		Coghill	2651		
Bailey	1029	Cohen	3006	Halfway	2734
Balcombe	3120	Collector	2875	Hall (Murray)	2086
Bald (Cook)	3848	Conder	2064	Hanging Rock	1803
Bald (Murray)	2941	Cookbundoon	2973	Hannibal	2400
Ballanya	2328	Copperhannia	3165	Harris (Murray)	3124
Bangalore	2925	Coree	4661	Hart	3002
Barber	2226	Cowangerong	4466	Hartwood	3837
Barnett	2400	Cowhole	2204	Harvey (Argyle)	3134
Barren Jack	3160	Cowper (Argyle)	3051	Havelock	2417
Barry	2589	Cullarin	2947	Heathcote	1001
Base, Lake George North	2262	Cunningham	2730	Highest Point	3309
		Currowang	2915	Hobbs	2993
Base, Lake George South	2274	Curtis (Argyle)	2945	Holt (Argyle)	2015
				Howard (Bathurst)	3069
Baw Baw	2761	Dairy	2378	Hughes	3152
Beck	2119	Darling	2748		
Ben Lomond	5000	Davlin	2964	Inverary	2164
Berlang	3425	De Drack	2769		
Big Hill (Argyle)	2391	Dixon	2674	Jacqua	2433
Billyrambija	2496	Doughboy	2552	Jeir	2557
Bindo	4460			Jellore	2732
Blackheath	3500	Edward	2797	Jerrabombera	2552
Black Mount	2658	Ellenden	2956	Jerrara	2530
Blanketburn	2105	Elliott	2827	Jinden	2422
Blaxland (Northd.)	1188	Elrington	3077	Jobson	2133
Blue Hill	1040	English	2028	Junction	2123
Blue Mountain	2376	Euroka	2020		
Bohara	2616	Evandale	2519	Kangaroo	2407
Bombay	2076			Keira	1533
Boro	2445	Fairfield (Murray)	3506	Kembla	1752
Boundary (Murray)	3431	Fairy	2874	Kenmore	2314
Bowning	2605	Finlay	2281	Kingsdale	2249
Boxer	2420	Fitton	3107	Kingsdale North	2753
Bradley	2225	Flakney	1742	Kooree	1186
Breadalbane	2401	Fox	2134	Krawarree	2697
Broker's Nose	1437	Foxlow	3829		
Brooks	2912	Freestone	2406	Lake Bathurst	2388
Broughton	1876	Fulton	3496	Lambie	4219
Buffalo	2519			Larbert	2018
Bullamelita	2584	Galore	1229	Leakfield	2191
Bulli	1336	Gap Range (Argyle)	2940	Lee	1950
Bumble	1154	Gap Range (Murray)	2472	Lighthouse	1260
Bungonia	2062	Geegullalong	2288	Limekilns	2040
Bunhybee	3106	Gibraltar (Camden)	2830	Livingstone	3058
Bunnaby	2498	Gibraltar (Murray)	2938	Lobb	3434
Burke	2899	Gibson	2272	Lockyer	1028
Burra (Clarendon)	2361	Gidleigh	3324	Long Swamp	2271
Burra (Murray)	3746	Gillamatong	2955	Lowes	3708
Butler (Argyle)	2669	Ginginenbullen	2624		
Butler (Murray)	2921	Glasgow	3190	Macalister	3390
Butmaroo	2814	Glenrock	2058	Macquarie	3943
Butts	3057	Goldsmith	2137	Madden	1307
Byron	2540	Googong	3320	Madden New	1333
Bywong	2814	Goulburn	2073	Major	4366
		Gourock	3900	Majura	2909
Cambewarra	2044	Govan	3258	Malton	2428
Cameron	2971	Governor	2397	Manar	3198
Campbell (Murray)	3906	Greenwich	2513	Mare's Range	2942

* Compiled from official sources. (1) The heights of these stations are above H.W.S.T., Fort Denison, and have all been determined by the officers of the Trigonometrical Survey of New South Wales, except those distinguished by an asterisk.

SCHEDULE OF PRINCIPAL MOUNTAINS, &c.—*Continued.*

Name.	Height in Feet.	Name.	Height in Feet.	Name.	Height in Feet.
Marulan	2122	Percy	2723	Taylor	2800
Meadow	2488	Piccaree	2621	Tennent	4524
Meldrum	2478	Plumb	2476	Terramungula	3141
Micaligo	3564	Podmore	2870	Terranna	2200
Milbang	2406	Pomingalarra	1206	*The Pilot	6020
Millpost	2912	Poppett	3004	Tinderry	5298
Minjary	2493	Popran	1158	Tomah	3276
Minshull	2052	Purrorumba	2905	Tomboye	2112
Misery	2345			Tonga	2355
Molonglo	3670	*Ram's Head	6840	Towrang	2849
Molonglo Sugarloaf	3264	Ramsay (Murray)	2406	Tumanang	4821
Moore (Murray)	1971	Rankin (Argyle)	2065	Tumanmang	4656
Morris	2265	Razorback	1074	Tumorrammia	3995
*Mount Kosciusko	7256	Rob Roy	3584	Turalla	3032
*Mount Seaview	6000	Rockfield	2600	Turpin	2198
Mountain Ash	2790	Rocks	3395	Twin	2359
Mugga Mugga	2662	Rocky (Argyle)	2353	Twynam	3143
Mullengullenga	2364	Rossi	2451		
Muller	3028	Round Hill (Murray)	2872	Vessey	2842
Mulloon	2312	Ryan (Argyle)	2660		
Mundoonen	2674	Ryan (Georg.)	3467	Wallace	2738
Murray	2164			Wanyambilli	1854
		Saddleback	2180	Warrawolong	2094
Nadgigomar	2396	Schofield	2509	Warren	1110
Nanima	2352	Scott (Cook)	1963	Warrima	2342
Narrancarrie	2744	Scott (Murray)	2658	Warroo	2200
Narrawa	2658	Shelly	2288	Wattle Flat	2271
Nattery	2514	Shepherd	2335	Wattman	3389
Nobby (Murray)	2292	Shingle	2480	Wayo	3052
Norrong	2624	Shivering	3678	Wells (Georg.)	3268
North Black Range	3729	Smalley	2852	Wheel of Fortune	1610
Nundialla	2554	Snow	2373	Willan's Hill	1002
Nunnery	3122	South Black Range	4141	Willigam	3380
		Spring (Murray)	2904	Wingecarribee	2778
Oak	2614	St. George (Murray)	2893	Winter	3262
Oallen	1995	St. Paul	2511	Wologorong	2419
One Tree	2863	Stockyard	1268	Wood	2692
Osborne	2938	Stony	4199	Woolowolar	3074
Ovens	4164	Strathfield	2076	Wooragee	2815
		Sugarloaf (Argyle)	2775	Wyanbene	3468
Palerang	4134	Sugarloaf (Northd.)	1327		
Parksbourne	2491	Sutton	2070	Yarragundry	1065
Paton	2568	Sutton Forest	2491	Yarralaw	2043
Peach	3088			Yarrow	3535
Peddles Hill	1685	Tarago	2724	Yaven	1813
Pegar	3118	Tarago Lower	2352	Yengo	2164
Pemberton	2872	Tarlo	2817		

SCHEDULE OF THE PRINCIPAL MOUNTAINS, &c., IN EASTERN AUSTRALIA, AND THEIR HEIGHTS (1). [QUEENSLAND.]

Name.	Height in Feet.
DARLING DOWNS.	
*Bald Hill	2469
*Barrabaranga	2605
*Bloodwood	1464
*Bodumba	2013
*Bullaganang	2065
*Cordeaux	4100
*Domville or Millmerran	2089
Edwards	2300
*Fair Hill	2446
Gentleman's Seat	1874
*Gowrie	2211
*Gammie	2206
Huntley	4153
*Jibbinbar	3225
*Irving	1515
Leslie	2683
*Magnus	3206
*Maidenhead	2710
*Mallard	1943
Melbourne	3000 approx.
*Mitchell	3751
*Mocatta	2695
*Mt. Maria	1403
*Mowbullan	3604
*Norman	4066
Peel	2325
*Picnic Point	2320
*Rolleston	1975
*Rubieslaw	2202
*Russell	1640
*Square Top	1811
*Tabletop	2023
*Texas	1642
Wilson's Peak	4042
*Wyagampinny	2216
MORETON DISTRICT.	
Barney	4300
Beerwah	1760
Clunie	3000 to 4000
*Cooyar	2449
Coonowrin	1160
*Dawson	2251
D'Aguilar	2439
Flinders Peak	2240
*Forbes	1550
Frazer	2030 approx.
Gipps	3500 approx.
*Grandchester	1158
*Hallen	1265
Knapp's Peak	2000 approx.
Lindesay	4064
*Ma Ma	1690
Nebo	2600 approx.
Neilson	2643
Peaks of Blackall Range	1200 to 1600

Name.	Height in Feet.
*Perseverance	2643
*Samson	2251
*Silverwood	2744
*Tamborine	1809
Tibrogargan	1170
Tunbubudla	1020
*Zahel	2885
WIDE BAY.	
Arthur	1620
Christina Peak	1391
Desailley	1250
Double Sloping Mt.	1440
Pinbarren	1160
Wensley	1210
Widgee	1600
PORT CURTIS.	
Arthur's Seat	1650
Atherton	1430
Berserker	1480
Castle Tower	2048
Cockscomb Hill	1270
Dome	1356
Dromedary	1490
Flat Top	1470
Grevillea	1480
Gwynne Range	1262
High Double Mt.	2545
Hummock	1433
Larcombe	2060
Mt. Archer	1612
Mt. Stanley	2430
Mt. Maria	1100
Mt. Wellington	1200
Mulgrave	2040
North Hill	1185
Notch Mt.	1576
Permien Peak	1480
Phipps	1810
Phillip	1250
Pine Mt.	1213
Pine Mt.	1560
Pisgah	1800
Pyramid Hill	1640
Tom	1323
Walsh Mt.	1646
Warroo	1474
Westhill	1820
BURNETT.	
*Dangore	1945
*Haly's Round Mt.	2120
*Mt Haly	3130
Perry	2120
LEICHHARDT.	
Broadsound Tableland	2000 to 3000

Name.	Height in Feet.
Buckland's Tableland	abt. 2000
Connor's Range Peaks	2000 to 3000
Denham	2000 to 3000
Drummond Range	2000 to 3000
Mt. Funnel	1190
Mudgee	2247
Peak Range	abt. 2000
Unnamed	1072
"	1278
"	1415
"	1411
"	1374
KENNEDY DISTRICT.	
Abbott	3460
Aberdeen	3250
Ben Lomond	1502
Barra Castle Hill	1970
Bishop's Peak	2760
Bowen	3650
Brownrigg Peak	1136
Burnett	2210
Coast Range	3000 to 4000
Courtenay	2620
Dalrymple	4255
Diamantine	3160
Double Mt.	2160
Double Mt.	1880
Double Peak	1290
Eliot	4060
Frederick Peak	3600
Gloucester Peak	2000
High Peak	1900
Hook	1520
Leach	2750
Long	abt. 3000
Long Hill	2332
Luce	1056
Mackenzie Peak	2216
Magnetic Island Pk	1700
Mt Challenger	1776
Mt. Maguire	2580
Mt. Dryander	2935
Mt. Esk	1134
Pitt	2352
Pring	1462
Remarkable	2100
Richardson	1940
Roundback	2580
Round Hill	3125
Slack	2200
Straloch	2990
Stewart	1825
Station Hill	1900
Table Hill	2200
Three Heads	2428
Whitsunday	1568

(1) Compiled from official sources. * Denotes mountains whose heights have been etermined by the officers of the Trigonometrical Survey of Queensland.

Schedule of the Principal Mountains, &c.—*Continued.*

Name.	Height in Feet.	Name.	Height in Feet.	Name.	Height in Feet.
Cook District.		Flat Hill	1034	Massie	4014
		Formartine	2612	McCann	2530
Bay Hill	1273	Grant	1500	One Tree Hill	1460
Bartle Frere	5438	Grey Peaks	3357	Peter Botte	3311
Barren Hill	1376	Grey Peaks	3052	Red Peak	2032
Bellenden-Ker	5158	Harold	4150	Round Hill	2189
Buchanan	2086	Hann	2250	Round Mt.	1670
Burke	1880	High Mt., or the Pyramids	abt. 2300	Sophia	4253
Conical Hill	3016			Theresa	2600
Clump Mt.	1338	High Peak	2371	Walsh's Pyramid	3016
Demi Peak	1758	Heights of Dagmar	1454		
Distant Hill	3573	Jessop Hill	1500	Gregory South.	
Emma	1526	Liddle Hill	1474		
Flat Peak	2081	Mar	2214	Hetherton	1950

SCHEDULE OF PRINCIPAL MOUNTAINS IN WESTERN AUSTRALIA, AND THEIR HEIGHTS.*

Name.	Height in Feet.	Name.	Height in Feet.	Name.	Height in Feet.
Eucla Division.		Gascoyne Division.		Mt. Alexander	1244
				Mt. De Courcy	1500
Mt. Barren	1564	Barloweerie	1394	Mt. Brockman	3596
Mt. Drummond	1070	Black Range, K 45	1215	Mt. Bruce	2852
		Conical Hill	1471	Mt. McRae	3257
South-Western Division.		Coolarda, K 42	1486	Mt. King	2195
		Dalgaranger	2100	Mt. Margaret	2710
		Narlandy Hill	1230	Mt. Pyrton	2765
Boodarockin	1323	Mt. Luke	1660	Mt. Righthofen	1250
Carnamah	1108	Mt. Lulworth	2330	Point on Serpentine Creek	3257
Ellen's Peak (Stirling Range)	3420	Mt. Gould	2302		
		Mt. Hale	2371	Y 7	2172
Geelakim	1553	Mt. Puckford	1890		
Marah	1100	Mt. Cleve	1846	Kimberly Division.	
Mt. Many Peak	1855	Mt. Gascoyne	2572		
Mt. Lindesay	1469	Mt. Egerton	3304	H J 22	1380
Mt. Frankland	1384	Mt. Palgrave	2352	J 10	1649
Mt. William	1688	Mt. Augustus	3634	J 18	1374
Mt. Leseur	1021	Telegootherra	1730	J 39	1655
Mt. Gibson, K 3	1634	Woogoo, V 4	1391	Mt. Dockrell	1685
Mt. Scratch	1040			Mt. Phillip	1809
Mt. Kenneth	1540	North-West Division.		Mt. Amherst	2500
Noongarin	1235			Mt. Barrett	2297
Orongorup Range	2145			Mt. Coghlan	2084
Toolbrunup (Stirling Range)	3341	Cheearra	1294	Mt. John	1759
		Cunmagnunna	1260	Mt. Jarrad	1507

* Compiled from official sources.

PROCEEDINGS

OF THE

Royal Geographical Society of Australasia,

BRISBANE.

TENTH SESSION.

AUGUST 20, 1894.

The President, Mr. J. P. Thomson, F.R.S.G.S., etc., in the chair.

There was a large attendance of the members and their friends: among those present being His Excellency the Governor, Rear-Admiral Bowden-Smith, Sir William MacGregor (Administrator of British New Guinea), Captain Arbuthnot and a number of ladies.

The President on behalf of the Patron, the Council, and the members of the Society, extended to Sir William MacGregor a cordial welcome to the meeting, after an absence of many years, and at the same time he expressed sorrow that indisposition had prevented Lady MacGregor from attending. (Applause.) To His Excellency the Governor, and to Admiral Bowden-Smith, the President extended a similar hearty welcome. In doing so he alluded to the valuable additions made to geographical knowledge through the British navy, and especially so recently in Australian waters. He also said the Society was all the more pleased to meet the Admiral, he being a most valued Fellow of the Parent Society of London. (Applause.)

The minutes of the Ordinary Monthly Meeting, held May 31, 1894, and of the Annual General Meeting, held July 12, were read and confirmed.

Letters congratulating Mr. Thomson upon his election to the position of President of the Society, were read from Baron Sir Ferd. von Mueller, K.C.M.G., etc., the Council of the Victorian Branch of the Society, from other scientific institutions and eminent scientists.

The Hon. Librarian, Major A. J. Boyd, laid upon the table a list of the donations received since the Annual General Meeting.

The President read a paper entitled "A Survey of Recent Exploration in British New Guinea." It was illustrated by a large map, several unique ethnological specimens and by lantern slides. The lantern was very ably managed by Dr. John Thomson, M.B.

TOBACCO AND SILK EXHIBITS.

Mr. P. M'Lean exhibited specimens of tobacco leaf grown from New Guinea seed and a brocade silk made from Queensland cocoons. He emarked that a small quantity of tobacco seed had been sent down in a

cartridge case by Lady MacGregor to himself. Some of the seed had been handed to Mr. Soutter, who had grown the leaf exhibited and had sent another sample to England, where it had been pronounced of very good quality. There were now hundreds of farmers growing leaf obtained from this small quantity of seed. (Applause.) Regarding the silk, Mr. M'Lean remarked that some time ago he made a collection of cocoons and forwarded them to the Agent-General to see if a market could not be opened. These had been woven into the brocade, the weaver reporting that finer silk had not passed through his hands. The silk was valued at from 15s. to 16s. per lb., and worth to the grower about 1s. 8d. per lb. The brocade was of elegant design, and was much admired by those present.

VOTES OF THANKS.

Mr. Thomson briefly thanked Sir William MacGregor for his presence and Dr. Thomson for manipulating the lantern. The votes were carried by acclamation. On the motion of His Excellency the Governor a very cordial vote of thanks was passed to the President for his paper.

SEPTEMBER 28, 1894.

The President, Mr. J. P. Thomson, F.R.S.G.S., etc., in the chair.

The minutes of the meeting held August 20, 1894, were read and confirmed.

Elections.—Ordinary members: Alex. Young Fullerton, B.A., L.R.C.P., M.R.C.S.; Messrs. E. Gregory, S. N. Innes, W. Jones, and W. J. Trouton.

The President intimated that the Council had appointed Dr. H. R. Mill to represent the Society at the Sixth International Geographical Congress to be held in London in August, 1895.

The Hon. Librarian, Major A. J. Boyd, submitted a list of donations and exchanges received since the previous meeting.

The President exhibited a well-preserved copy of John Reinold's second edition of the *De Situ Orbis* of Pomponius Mela, who flourished about the middle of the first century of our era, and gave a brief account of the work and life of the author.

A paper by Major A. J. Boyd was held over till next meeting.

OCTOBER 19, 1894.

The President, Mr. J. P. Thomson, F.R.S.G.S., etc., in the chair. His Excellency the Governor was present.

The minutes of the meeting held September 28, 1894, were read and confirmed.

Elections.—Lady Norman, Mesdames W. Soutter and J. P. Thomson, Miss Laura Lucie Finlay, Mr. Thomas H. Owens.

The Hon. Librarian, Major A. J. Boyd, submitted a list of the donations to the library, received since the previous meeting.

Major Boyd then initiated a discussion upon the theory of "The Discovery of America by the Chinese."

The subject was capitally illustrated by a large coloured map and a facsimile of the Aztec calendar or water-stone.

The lecturer opened his subject by pointing out that there were four candidates in the field to whom the great discovery of the Americas might be attributed. The right of two of these was undeniable. Of the northmen under Lief Ericson, the Chinese, the Phœnicians, and the Spaniards under Columbus, the first and the last have been admitted on all hands to be the discoverers, but the discovery by the Orientals is open to a great deal of discussion. After discussing a paper by the Rev. Frederick J. Masters, D.D., superintendent of Chinese M.E. Church missions on the Pacific coast of North America, and vice-president of the Geographical Society of California, which supported the claim of the Chinese, it was sought to be shown that the Chinese carried to Mexico those monuments of religion, art, science, and industry which so astonished the Spanish invaders, and that the Indian dialects on the Pacific coast had a great affinity to the Chinese; added to which the Chenook Indian tribes of the north-west of North America are so similar in stature and features to the Chinese that from photographs it would be impossible to determine whether they were Indians, Chinese, or Japanese. With respect to the hieroglyphics which were found there, the lecturer pointed out that these were far more likely to be Egyptian hieroglyphics; first, because educated Chinese had much diffidence in pronouncing them to be Chinese characters; and, secondly, because if in considering the Aztec idols the Egyptian type was clearly defined, the architecture generally of the Aztecs was of pronounced Phœnician origin, and the decoration Egyptian, Greek, Assyrian, and Persian. In art we have the winged vase from Mexico, which is no other than the winged disk of Egypt and Phœnicia. When we come to consider the architecture of the present day in China and Mexico, we find a few resemblances, such as houses roofed with convex tiles, as is the case in China. The belief in ransmigration of souls, household gods, music, chantings and worship, the use of the same kinds of charms, cremation, similarity of marriage ceremonies, the notion of a celestial dragon devouring the sun, the Mexican calendar were then passed in review, and admitted to be certainly not atters of chance. But how, in the face of the light which has been thrown on the history of China of late years, can it be pretended that the enormous rock temples and substructures of massive blocks of stone, were constructed by a nation whose greatest achievement was the building of a wall of stupendous length and other proportions, mainly of bricks and mould, artly only of the latter? And what shall be said of the works of a people who carried this wall over perpendicular precipices, and through all but impassable gorges? Can any cyclopean rock structures be shown that were constructed by the Chinese? And if these people had voyaged to America and had reached Mexico, Central America, and Peru, and then reared these rock walls and carved the rock sculptures, then we must admit that they also erected the precisely similar buildings in the Austral group at Easter

Island, and others of the Pacific groups, in order to reach which they must have sailed down from China, through the Dutch East Indies, through Torres Strait, the Marshall Islands, Samoa, and so on. There is no evidence that they did so. On the question of proof by means of Chinese coins, it was shown that these might have been lost or hidden by the wandering Chinese digger of modern days. How the Chinese arrived in Mexico was next dealt with. Their supposed track from Shanghai through the Japanese Islands, Kurile and Aleutian Islands, to the coast of Alaska, and the continuance of the voyage to the Gulf of California were pointed out. But the lecturer showed that the class of vessels which are supposed to have taken this route were fishing boats, manned by an ignorant crew, which were blown out of their course and drifted away by the Japan current to the American coast. The Rev. Mr. Legge, lecturer in Chinese History and Literature at Oxford University, who is 80 years of age, and is the greatest living authority on the Chinese and their literature, having spent 50 years of his life in the country, mastered the language, and deeply studied the oldest and newest Chinese books, stated recently that there has been little or no change in the Chinese for 4,000 years. A list of wrecks on the Aleutian Islands, and on the north-western Pacific coast of North America, was then referred to. In 1710, 56 Oriental vessels had drifted across the ocean, but it is somewhat singular that in a list of some 60 wrecks since 1617, not a single Chinese vessel was found. Reference was made to the Chinese compass, and the lecturer concluded by pointing out the difference between the Chinese junks, ill-fitted, ill-manned, and badly navigated by timorous sailors, and the fine, wellfound, well-manned vessels of the Phœnicians.

The President opened the discussion, in support of Dr. Masters' views, and in referring to the rock structures of Easter Island, said that a Tongan chief had explained how they were built. That the Chinese compass had only 24 points, was, to his mind, a proof of the Chinese compass being imitated and improved upon by the Europeans. In Thompson's "Embassy to China," 1787, it was stated that the Chinese were not indebted to any nation for the compass, and in that view he entirely concurred. Few could oppose the discovery of America by the Chinese, because we had so little knowledge of their literature, but Dr. Masters, who was a profound Chinese scholar, had adduced evidence in support of the claim of the Chinese to the discovery of America, which in his opinion was very strong indeed.

His Excellency the Governor said that as a matter of fact only Major Boyd and Mr. Thomson seemed to be up in what the Chinese did or did not discover. In regard to the claims of the Chinese, the question arose, could the junks or their provisions and water hold out on such a voyage. Considering the weather which would be experienced, and the length of time which would be occupied, it was scarcely likely that a junk blown off its course could make a straight course to Mexico. It was, however, shown that by going north they could creep along from island to island and so arrive at America. One thing struck him and that was that judging by facial type the north-west coast Indians were descendants of the Japanese,

not of the Chinese. Still it was an enormous question. Columbus, of course, knew nothing of anything that had preceded his time, and he deserved all credit for his skill, pluck, and endurance, from all civilized nations. It did not seem to him at all likely that the Aztecs were affiliated with the Chinese. His Excellency concluded by moving a vote of thanks to Major Boyd for the able manner in which he had opened the discussion.

NOVEMBER 16, 1894.

The President, Mr. J. P. Thomson, F.R.S.G.S., etc., in the chair.

The minutes of the meeting, held October 19th, 1894, were read and confirmed.

Election.—Mr. F. D. G. Stanley, F.R.I.B.A.

A letter was read from His Excellency the Governor, apologising for his absence from the meeting.

In reply to Mr. Soutter, the President stated that the results of the recent observations of the transit of Mercury at Brisbane, which he had the privilege of conducting, were eminently successful and in every respect highly satisfactory. As an instance, he might mention that the difference between the calculated time of the external contact and the actually-observed time was only four-tenths of a second. Taking into consideration the extremely difficult nature of the observation of a transit, the results could not be improved upon. He had received several of the New South Wales results of the transit observations, including those by the Government Astronomer, but the weather had not been favourable and the observations were not not successful there.

A paper by Mr. R. H. Mathews, entitled "Notes upon the Kamilaroi Class System of the Australian Aborigines," was read by Mr. R. H. Lawson.

A paper by Mr. C. W. De Vis, M.A., "On the Word 'Kangaroo,'" was read by Mr. A. Meston.

DECEMBER 14, 1894.

The President, Mr. J. P. Thomson, F.R.S.G.S., etc., in the chair.

The minutes of the meeting held November 16, 1894, were read and confirmed.

A paper by Mr. R. H. Mathews on the "Aboriginal Rock Pictures of Australia," was read by the Honorary Secretary.

APRIL 26, 1895.

The President, Mr. J. P. Thomson, F.R.S.G.S., etc., in the chair.

The minutes of the meeting held December 14, 1894, were read and confirmed.

The President intimated that Mr. D. S. Thistlethwayte had been appointed by the Council to the position of Honorary Librarian.

The Hon. A. C. Gregory, C.M.G., etc., read a paper on the "Construction of the Spirit Level in its Application to Instruments for the Determination of Geographical Positions." An interesting discussion followed in which the President, Messrs. J. R. Atkinson and D. S. Thistlethwayte took part.

Mr. J. R. Atkinson read a paper on "Queensland Coast Lights."

JULY 22, 1895.

Annual General Meeting.

The President, Mr. J. P. Thomson, F.R.S.G.S., etc., in the chair.

There was a large attendance of the members and their friends, including a number of ladies.

The minutes of the Ordinary Monthly Meeting, held April 26th, 1895, were read by the Honorary Secretary, Mr. John Fenwick, and confirmed.

Apologies for inability to attend were read from His Excellency the Governor, the Hon. the Chief Secretary, Hon. A. C. Gregory, the United States Consul, and Mr. C. B. Fletcher.

Report of Council, Session 1894-95.

The Council has the honour of submitting to the members of the Royal Geographical Society of Australasia, Queensland Branch, the tenth Annual Report upon the operations of the Society during the preceding year ending 30th June, 1895.

Members.—One honorary and sixteen ordinary members have been added to the Roll of the Society. The honorary membership was conferred upon Lady Norman in recognition of the valuable services rendered to the Society by her husband Sir Henry W. Norman, G.C.B., G.C.M.G., &c., who is himself a subscribing member. Of the latter class it is gratifying to state that three are ladies.

Financial Statement.—The Annual Financial Statement is submitted by your esteemed honorary treasurer who, for several years past, has faithfully and cheerfully carried out the duties of that responsible position to the entire satisfaction of the Council.

It will be seen that in addition to the usual ordinary expenditure connected with the operations of the Society, a sum of £8 was disbursed to defray one-third of the expense of the Conversazione given to the members of the Australasian Association for the Advancement of Science by the Royal Society of Queensland, members of the Medical Profession, and this Society, at the time of the Brisbane session of the Science Association.

Monthly Meetings.—Six ordinary monthly meetings of members were held during the session, when papers on the following subjects were read :—"A Survey of Recent Exploration in British New Guinea"—by the President, Mr. J. P. Thomson, F.R.S.G.S., &c. This paper was illustrated by maps,

ethnological specimens, and by lantern slides admirably displayed by Dr. John Thomson, M.B. "On the Discovery of America by the Chinese," based upon Dr. Masters' paper published by the Geographical Society of California—by Major A. J. Boyd. This paper was well illustrated by a large-scale map prepared by Major Boyd. "Notes upon the Kamilaroi Class System of the Australian Aborigines"—by Mr. R. H. Mathews, licensed surveyor, of Parramatta, N.S.W., was read by Mr. R. H. Lawson. "On the Word 'Kangaroo'"—by Mr. C. W. De Vis, M.A., read by Mr. A. Meston. "The Aboriginal Rock Pictures of Australia"—by Mr. R. H. Mathews, read by the Hon. Secretary. "On the Construction of the Spirit Level in its Application to Instruments for the Determination of Geographical Positions"—by Hon. A. C. Gregory, C.M.G., F.R.G.S., &c. "The Lighting of Our Coast"—by Mr. J. R. Atkinson, licensed surveyor, Ipswich.

Council Meetings.—During the year the Council held fifteen meetings for transacting the usual routine business of the Society. As a rule these meetings were well attended throughout.

Honorary Librarian.—Mr. D. S. Thistlethwayte, who is an old and valued member of the Society, was appointed to the position of Honorary Librarian vacated by Major A. J. Boyd, whose valuable services are fully appreciated by the Council.

Proceedings of the Society.—There has been and still is an increasing demand for the current and back numbers of the Society's volumes of "Proceedings and Transactions." An inventory of volumes in stock was made during the session, when it was found that there are only about a dozen copies of the first issue left.

The Library has received a number of very valuable donations and exchanges since the last Report was written. In thanking those who have so liberally contributed to our stock of literature, the Council desires to make special acknowledgment of the very acceptable gifts of books, with which His Excellency the Governor has been pleased to enrich our library.

JOHN FENWICK, *Hon. Secretary.*

ROYAL GEOGRAPHICAL SOCIETY OF AUSTRALASIA (QUEENSLAND BRANCH).

Financial Statement for the Year ended 30th June, 1895.

Dr.	£ s. d.	Cr.	£ s. d.
To Balance from 30th June, 1894	82 9 1	By Printing the "Proceedings and Transactions" of the Society	48 19 10
,, Members' Subscriptions, etc.	77 18 6	,, Printing Circulars and Post Cards, and the purchase of Stationery, &c.	20 3 1
,, Entrance Fees	16 16 0	,, Contribution to United Service Institution, for Attendance, Gas, &c.	10 0 0
,, Special contribution from Sir H. W. Norman towards Conversazione expenses	1 0 0	,, Library Expenses	8 14 6
,, Refund from Geographical Congress on account of postage	0 16 0	,, Fire Insurance	2 10 0
,, Interest, Government Savings Bank	1 18 4	,, Contribution to expenses of Science Association Conversazione	8 0 0
		,, Refreshments at Monthly Meetings	3 2 4
		,, Advertising	0 13 9
		,, Sundries (including exchange)	3 16 10
		,, Balance, 30th June, 1895— Government Savings Bank £51 18 4; Queensland National Bank £22 19 3	74 17 7
	£180 17 11		£180 17 11

CHARLES B. LETHEM, *Hon. Treasurer.*

Examined with the Books, checked with Receipt Book, Vouchers, and Bank Books, and hereby certified to as correct.

ALEXR. MUIR, *Hon. Auditor.*

Brisbane, *9th July, 1895.*

On the motion of Mr. W. Soutter, seconded by Mr. C. B. Lethem, the report was adopted.

Presidential Address.

The President delivered his annual address, taking as the subject for his remarks the Physical Geography of Australia. The address was illustrated by six large coloured maps, specially prepared.

Mr. R. Gailey moved a cordial vote of thanks to Mr. Thomson for his admirable address.

Mr. Thistlethwayte, in seconding the motion, complimented the President on the able and exhaustive address which he had delivered. He said he must also bear testimony to the very great and valuable services which the President had rendered to the Society, first as Honorary Secretary and since in the office of President. (Applause.)

Mr. Meston, as a visitor, warmly spoke in favour of the motion. He said that the address which Mr. Thomson had delivered was a credit to him, an honour to the Society, and an important contribution to the geographical literature of Australia. It appeared to him that a paper of that sort was of sufficient importance for the Government to have it printed and circulated among the State school teachers.

The vote of thanks was carried by acclamation. The President briefly expressed his thanks for the manner in which his services had been spoken of.

Election of Officers.

Mr. J. P. Thomson was re-elected by acclamation to the position of President. The other offices were filled as follows:—Vice-President, Mr. Ormond C. Smith; Hon. Treasurer, Mr. John Fenwick; Hon. Secretary, Major A. J. Boyd; Hon. Librarian, Mr. D. S. Thistlethwayte; Hon. Auditor, Mr. A. Muir; and Council, Mr. J. P. Thomson, Hon. A. C. Gregory, C.M.G., Mr. D. S. Thistlethwayte, Major A. J. Boyd, Mr. J. Fenwick, Mr. C. B. Lethem, Captain W. C. Thomson, and Messrs. J. Mathieson, J. Irving, T. S. Sword, O. C. Smith, and A. Muir.

Conversazione.

The remainder of the evening was spent in a social manner, refreshments being handed round, and a musical programme under the direction of Mr. Seymour Dicker contributed. He was assisted by Misses Johnson and Iliffe and Messrs. Deazeley and Portus. By special request, Mrs. Burston favoured the company with Paderewski's minuet. It was excellently played and highly appreciated.

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(P) Members who have contributed papers which are published in the Society's "Proceedings and Transactions." The numerals indicate the number of such contributions.

(PP) Past President.

A dagger (†) prefixed to a name indicates a member of the Council.

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Should any error or omission be found in this list, it is requested that notice thereof be given to the Hon. Secretary.

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NOTE.—For want of space the usual list of donations and exchanges is held over till next issue.—*Ed.*

PROCEEDINGS AND TRANSACTIONS

OF THE

Queensland Branch

OF THE

ROYAL GEOGRAPHICAL SOCIETY

OF

AUSTRALASIA.

11th SESSION,

1895-96.

PUBLISHED UNDER THE AUTHORITY OF THE COUNCIL OF THE SOCIETY. EDITED

BY

J. P. THOMSON, F.R.S.G.S., President,

Corresponding Member of the New York Academy of Sciences, etc., etc.

The Authors of Papers are alone responsible for the opinions expressed therein.

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FORM OF BEQUEST.

I give and bequeath to the Honorary Treasurer, for the time being, of the QUEENSLAND BRANCH OF THE ROYAL GEOGRAPHICAL SOCIETY OF AUSTRALASIA, *the sum of* ....

for the benefit of the said Branch of the Royal Geographical Society of Australasia, to be expended as the Council of the said Society may deem expedient for the promotion of Geographical Science or the purpose of exploration in Australasia.

NOTE.—*The Geographical Journal* is published monthly by the Royal Geographical Society, London; price, 1s. 6d. per copy to Members of the Royal Geographical Society of Australasia, Queensland. The prices of Supplementary Papers and other publications of the former Society may be obtained on application.

The Scottish Geographical Magazine is published monthly by the Royal Scottish Geographical Society; price, 1s. per copy to Members of the Royal Geographical Society of Australasia, Queensland.

N.B.—All Donations presented to the Royal Geographical Society of Australasia, Queensland, are acknowledged by letter and in the printed "Proceedings and Transactions."

TRANSACTIONS

OF THE

Royal Geographical Society of Australasia,

BRISBANE.

Captain Cook and his First Voyage round the World, 1768 to 1771; with Special Reference to his Exploration of the Queensland Coast.

By His Excellency General Sir Henry Wylie Norman, G.C.B., G.C.M.G., C.I.E., F.R.G.S., etc.

[Read at a Meeting of the Society, October 25th, 1895.]

Ladies and Gentlemen,

Last year I received a copy of Captain Cook's Journal, kept during his first voyage round the world, made in His Majesty's barque *Endeavour* during the years 1768 to 1771, being a literal transcript of the original manuscript, edited by Captain Wharton, R.N., Hydrographer to the Admiralty. Many accounts of Cook's voyages, and of this voyage in particular, have already appeared; but, speaking generally, these have been more or less compilations of various logs or journals, and have been usually what is called "edited" by persons of supposed literary ability, and not given in original as written at the time. I was greatly interested in this original Journal, which contained in quaint language and with old-fashioned spelling, a very full account of Cook's voyage along the coast of our Colony of Queensland from what is the southern limit of our boundary at Point Danger up to Torres Straits, and the account is made additionally interesting by Captain Wharton's introduction and notes, which are given separately, and not incorporated with the Journal, which latter is apparently altogether in Cook's words as written day by day.

A perusal of this book added much to the admiration I had felt ever since I was a boy for Cook as a great navigator, and as one who was an honour to our nation, and I confess it had never occurred to me to suppose that any one would at the present day speak slightingly of Cook, until I happened to look at the Sydney "Evening News" of the 23rd February last, where in an account given by a writer in that newspaper of a voyage made about the South Sea Islands in a steamer from Punalou to Honolulu, there occurs the following passage :—

"At Kealakekua Bay, two stopping-places back, we had gone ashore to secure green cocoanuts, a delicious Hawaiian delicacy, and gaze upon the monument to Captain Cook, a scrubby little plaster affair, erected by the English, an unworthy memorial to a not particularly deserving hero. The landscape about Kealakekua Bay is not particularly beautiful, but it seems a pity that it should be still further disfigured by this absurd excresence."

It is very difficult to believe that any countryman of our own can have written in this style about Cook, or that the remark can have been written by a person of any country who had at all studied the career of Cook, who is generally looked upon as one of the most distinguished of Englishmen, and as one of the most eminent of the explorers and navigators of the world, an impression which I think is added to by a perusal of his Journal of the voyage about which I am to address you. I am glad, therefore, to have the opportunity to-night of speaking at a meeting of the Queensland branch of the Royal Geographical Society of Australasia, and giving some short account of Cook's life, even at the hazard of repeating what most of you know, and also of giving a sketch of this particular expedition, but especially of showing what he says of his voyage along the coast of Queensland with which so many of us are familiar and which we are accustomed to traverse with comfort and speed and with a remarkable immunity from accident, in the fine and well found and well managed steamers employed in the passenger and cargo trade of this Colony.

My account of Cook's general career need only be very brief. The son of a Yorkshire labourer, he was born in 1728 and at about fourteen years of age he ran away from a draper and

grocer to whom he was apprenticed, and shipped at Whitby on board a collier. No doubt there he had hard work and little comfort, but he learned in that severe school to be a seaman. For thirteen years nothing seems to be certainly known about him, except that he continued to be a sailor and that in 1755 he was mate of a vessel in the Thames, and then volunteered to serve on board H.M.S. *Eagle*, of 60 guns, as an able seaman. He was then 27 years of age and served on the North American and West Indian Stations until 1759, and saw some fighting at Louisburg and elsewhere. What promotion he received is not clear, but he must have attracted the favourable notice of Captain Hugh Palliser who commanded the vessel, for on the return of the ship in the year just mentioned, Cook was, through his captain's interest, made master, that is, navigating officer of H.M.S. *Mercury*. The vessel went to North America, and Cook was employed in taking soundings in the St. Lawrence River, to enable the fleet then attacking Quebec to take up safe positions in covering the army under Wolfe. After this he was engaged in surveying the intricate channels below Quebec, and it is stated that for many years his chart was the guide of navigation in that part of the St. Lawrence. He must have been an excellent surveyor, and that high authority, the present Hydrographer to the Admiralty, says that before Cook's day "charts were of the crudest description," and that it may be truly said he originated the art of modern marine surveying. From the *Mercury* he was transferred to the important position of master of the *Northumberland*, bearing the flag of Admiral Lord Colville, and during a winter spent by that vessel at Halifax, he applied himself to the study of mathematics and astronomy. He was present in this vessel at the capture of Newfoundland from the French, and was again employed in surveying.

In 1762 he came to England and married, but a few months afterwards he was called to Newfoundland by the Governor, Captain Graves, to make marine surveys, and in this work he was engaged until 1767, the latter part of the time under his old commander, Captain Palliser, who succeeded Graves as Governor. The charts he made during these years in the schooner *Grenville* are said by the Hydrographer to be admirable,

and they are not yet wholly superseded by the more detailed surveys of modern times. Captain Wharton says that "the originals of these surveys form part of the most precious possessions of the Hydrographic Office of the Admiralty."

In the sketch of Cook's life, which is contained in the book I refer to, Captain Wharton gives an interesting account of the voyages in the Pacific made prior to Captain Cook's time. They were attended by very great difficulties, and few of them were intended for the purposes of exploration pure and simple; and even those which started with that purpose found when they embarked on that great expanse, which Captain Wharton reminds us occupies nearly one-half of the surface of the globe, that prudence dictated that they should have a moderate certainty of, by a certain time, falling in with a place of sure refreshment. To quote the Hydrographer, "The provisions they carried were bad at starting, and by the time they had fought their way through the Straits of Magellan were already worse; water was limited and would not hold out more than a given number of days. Every voyage that was pursued tells the same story—short of water and eagerly looking out for an opportunity of replenishing it, and ever present in each captain's mind was the dread of the terrible scourge, scurvy. Every expedition suffered from it. Each hoped they would be exempt, and each in turn was reduced to impotence from its effects." * Voyagers nowadays hardly realise the obstacles of former expeditions. The prevailing winds and currents are known, the exact distance and bearing from one point to another are laid down on the chart; steam carries a vessel quickly over calm areas, and modern science preserves food fresh and palatable for indefinite periods, and the speed is so increased that an average of one hundred and fifty miles a day may be expected in a well-fitted sailing vessel. It is, therefore, not to be wondered at that enormous tracts of the Pacific were unknown at the time of the voyage described in this Journal.

What was unknown is summarised by Captain Wharton in

* I may remark that scurvy is by no means an extinct disease. This very day I read the following in the *Times* of the 12th of last month about an expedition fitted out with everything science could suggest and wealth purchase:—"THE JACKSON-HARMSWORTH POLAR EXPEDITION.—Vardö, September 11.—The steam yacht Windward, which took out the Jackson-Harmsworth Polar Expedition, arrived here yesterday. The crew suffered severely from scurvy last winter, and three men succumbed. Mr. Jackson left his winter quarters on March 3, and went northward with sledges and dogs.—*Reuter.*"

the following words :—" The whole of the east coast of Australia or New Holland, and whether it was joined to Tasmania on the south and New Guinea to the north ; the dimensions of New Zealand ; New Caledonia and the New Hebrides, with the exception of the fact that the Northern Island of the latter existed ; the Fiji Islands ; the Sandwich Islands ; the Phœnix, Union, Ellice, Gilbert and Marshall groups, with innumerable small islands scattered here and there ; the Cook Islands and all the Society Islands, except Tahiti ; the majority of the Paumotu Group ; the Pacific coast of North America north of 45degs. N. was unknown, and there was the great undefined and imaginary Southern Continent to disprove."

All this was blank, and it was apparently only owing to the action of the Royal Society that the voyage of 1767 was undertaken. A transit of Venus over the sun's disc was to take place in 1769, and as the Central Pacific afforded a favourable position for the observation of this phenomenon, that grand old Society memorialised the King to send a ship for the purpose. The request was complied with, Cook was selected for the command and given the rank of Lieutenant in His Majesty's Navy, and he was allowed to choose his own ship. He selected the *Endeavour*, one of the class of vessels with which he was well acquainted, a Whitby-built collier, stout and full bottomed, of three hundred and seventy tons, apparently not sheathed with copper. She proved a most suitable vessel. The log states she was a little crank, but an admirable sea boat. Her rate of sailing was slow, but her strength and flat bottom stood her in good stead when she made acquaintance with a coral reef.

Mr. Banks, a gentleman of private means, a scientific botanist, and afterwards, for a long time, President of the Royal Society, volunteered for the expedition, and had with him a staff of his own of artists and others. Dr. Solander, a Swedish naturalist, and Mr. Green, one of the assistants at the Royal Observatory at Greenwich, also accompanied him. It is no part of my design to attempt to describe the various scientific objects sought to be obtained, or that were obtained, by this expedition, but it may be observed that Cook had no chronometer.

The vessel carried ninety-four persons, all told, and they must have been somewhat crowded. Eleven out of the ninety-four

were civilians and their staff, and of the remaining eighty-three twelve were marines. Two medical officers formed part of the complement. The ship was provisioned for eighteen months and drew thirteen and a-half feet of water.

Strange to say there is no exact copy of Cook's orders, which were secret, but Captain Wharton considers he is able, from various references to them, to gather their purport. Cook was to proceed directly to Tahiti, and afterwards to prosecute the design of making discoveries in the Pacific by proceeding southward to the latitude of 40deg., and if he did not find land to continue his voyage to the west till he fell in with New Zealand, which he was directed to explore, and thence to return to England by such route as he should judge most convenient.

Precautions against scurvy, which had so terribly affected other expeditions, were specially made. Besides the supply of all anti-scorbutics then known, a quantity of malt was ordered to be taken, for the purpose of being made into wort, as a cure for scorbutic disorders, as prescribed by Dr. McBride. This malt was to be ground fresh every day, and three quarts of boiling water were to be mixed with one quart of ground malt, well stirred and then left to stand for three or four hours, after which the liquid was to be strained. The wort so prepared was then mixed with sea biscuit or dried fruits, and of this a patient was to take at least two meals a day, besides drinking a quart or more of the fresh infusion every twenty-four hours. There was little opportunity of trying the remedy, for the surgeon says that its use was almost entirely precluded, inasmuch as only three slight cases of scorbutic disorder occurred in the whole voyage, when wort was given and the symptoms disappeared. It is stated that sour krout, mustard, vinegar, wheat, inspissated orange and lemon juices, portable soup, sugar, molasses, vegetables (at all times when they could be got) were, some in constant and some in occasional use. Cold bathing was encouraged and enforced by example, the allowance of salt beef and pork was abridged from nearly the beginning of the voyage, and the sailors' custom of mixing the salt beef fat with their flour was forbidden, and throughout the voyage raisins were served with the flour instead of pickled suet. It is also stated that upon leaving England a stop was put to the issue of

butter and cheese. At Terra del Fuego wild celery was collected, and the breakfasts every morning were made with this herb, with ground wheat and portable soup, and no opportunity was ever lost of getting this wild celery and any other wild herb that presented itself.

Some portion of these arrangements for diet seem curious, but the result was in the highest degree satisfactory, as in the whole voyage, which lasted three years, there were only the three slight cases of scurvy already mentioned, and when the vessel passed Cape Horn the crew were as free from scurvy as they were when they left Plymouth, five months previously. It would have been satisfactory if some particulars had been given about the quantity of each article of the daily ration. Nothing is said about coffee or cocoa or tea. A stock of beer and rum was certainly put on board, but what quantity is not stated. If any one here knows how the portable soup of those days was prepared and composed, I am sure we should be very glad to hear particulars when I have finished this paper.

It will be seen that personal cleanliness is mentioned by Mr. Perry, the surviving surgeon, and Captain Wharton states that the tradition in the navy is that unusual attention was paid to cleanliness, and that the deck was more constantly scrubbed than had been usual, and that stoves were used to dry the decks below, even in warm weather. With respect to this washing and drying of the decks, I may mention that, when in the West Indies, I had access to the logs of several vessels of war, in which a severe epidemic of yellow fever raged, and I saw that in the only vessel which almost entirely escaped the epidemic, the practice of washing the lower decks was, for the time, entirely suspended, as the Medical Officer and Captain were under the impression that the steam from the decks below, in warm weather, had a bad effect, so the cleaning process, while the epidemic lasted, was confined to dry sweeping and scrubbing.*

* Before I commence to speak of the voyage I must explain that in the Journal the day is always calculated from noon to noon. This causes some confusion as to the actual date, especially when the hour is not stated. The effect of this may be illustrated by reference to the fact that what Cook styles 10 a.m. of the 21st is, according to our usage, 10 a.m. of the 22nd of the month, but whenever he refers to a p.m. hour, the day is the same as our own, and it is only in the hours from midnight to noon that our reckoning is disturbed. I have followed Cook's dates.

Cook's longitude is always given as West from the meridian of Greenwich, unless some other place is particularly mentioned. In fact, he reckons 360 degrees of longitude West of Greenwich, while we reckon 180 degrees West and 180 East. When Cook, therefore, says a place is in 210 degrees of West longitude, we must deduct 210degs. from 360degs., which leaves 150degs. of East longitude as the correct position.

Cook hoisted the pennant, on this voyage, in the Basin at Deptford, on the 27th May, 1768, and the crew were employed in fitting out the ship and in taking in stores and provisions until the 21st July, when the vessel moved into the river and anchored in Galleons Reach until the 30th July, when she started, and, in the deliberate fashion of those times, did not arrive in Plymouth Sound until the 14th August—a voyage of three hundred miles in fifteen days.

The *Endeavour*, after laying in more provisions and stores and effecting certain repairs, put to sea on the afternoon of the 26th August, and anchored in Funchal Roads, Madeira, on the 13th September. At Madeira a large quantity of fresh beef and greens were taken on board, a live bullock, ten tons of water and 3,000 gallons of wine. This quantity of wine, it may be observed, would be equal to a supply of half-a-pint a day to each person of the ship's company for more than a year. It is also stated that twenty pounds of onions were issued to each man. The curious entry appears in the Journal that, on the 16th September, a seaman and a marine each received twelve lashes for refusing to take their allowance of fresh beef.

Cook sailed from Madeira at midnight on the 19th September, sighted the Peak of Teneriffe on the 24th, and on the morning of the 30th saw the Island of Bona Vista, one of the Cape de Verde Islands. On the 29th October he crossed the Line in 29° 29' West from Greenwich, and on the 8th November saw the land of Brazil, near Cape Santo Espiritu. On the 14th November the vessel anchored at Rio Janeiro, and left again on the 2nd December, having executed repairs and taken on board much beef, greens and yams. The Viceroy at Rio was very suspicious of the *Endeavour*, and was somewhat unfriendly. He did not by any means believe in or understand the alleged mission to observe the transit of Venus.

Cook was now determined to round Cape Horn, and thus avoid the constant anchoring and weighing necessary when passing through the Straits of Magellan. He had several communications with the people of Terra del Fuego, and, unfortunately, two negro servants, who had landed with Mr. Banks and remained ashore for the night, wandered away from their party and perished from cold.

Cook arrived at Tahiti on the 13th April, 1769, and observed the transit of Venus under favourable conditions on the 1st June. He left on the 13th July and explored and mapped the Society Islands, immediately to the westward, which had never before been visited. Cook then went south as far as 40deg., discovering one of the Austral group on his way, and finding no sign of the hypothetical Southern continent, and the weather being very bad, he made for New Zealand, and on the 7th October he arrived at Poverty Bay, and during the ensuing six months he completely circumnavigated and mapped the islands of New Zealand. In his communications with the natives, he was greatly helped by a very intelligent native named Tupia, whom he took on board at Tahiti, as it was found that his language and that of the New Zealanders were sufficiently identical to enable him to act as a most efficient interpreter. Cook's account of New Zealand is interesting and comprehensive, and it occupies just one hundred pages of his book.

On leaving New Zealand, he determined to explore the unknown eastern coast of New Holland, and the health of his men and the good order on board enabled him to make this good use of his time, instead of having to hurry on to a civilized port. He took his departure on the 1st April, 1770, from the neighbourhood of Cape Farewell, and decided to sail to the westward, until he fell in with the east coast of New Holland, and then to follow the line of that coast to the northward, or whatever other direction it might take, until he arrived at its northern extremity, and if this should be found impracticable, then to endeavour to find the land or islands discovered by Quiros, the Spanish navigator, which island, Captain Wharton explains, is Espiritu Santo, the northern island of the New Hebrides, which Quiros supposed to be a part of the great southern continent.

On the 19th April land was seen, when the vessel was in 37deg. 58min. south latitude, and longitude 210deg. 39min. W., to which the name of Point Hicks was given, because Lieutenant Hicks first discovered the land. Point Hicks Hill is the name now borne by an elevation that seems to agree with this position. Captain Cook was of opinion that from his longitude compared with that of Tasman, the body of Van Dieman's Land should have borne

due south, but no land was visible in that quarter, although the weather was clear. Captain Wharton remarks that had not a gale on the previous day forced Cook to the northward, he would have made the north end of the Furneaux Group, and probably have discovered Bass's Strait, which would have cleared up the doubt as to whether Tasmania was an island or not—a doubt which remained unsolved until Dr. Bass sailed through the Strait in a whaleboat in 1799.

On the night of the 20th he brought to, two leagues from a small island, now called Gabo Island, and close to a point which he called Cape Howe, the position of which as given by Cook is almost exact. Cook now coasted along the shore and describes the coast, but had no opportunity of landing—though he saw, on the 25th April, a bay which appeared to be sheltered from the north-east winds, now called Jervis Bay, but he was not able to look into it as he had the wind with him and the appearance was not favourable enough to induce him to lose time by beating up to it. On the 29th April he stood into another bay and anchored under the south shore, two miles within the entrance and remained until the 6th May, when he weighed anchor and, on leaving the bay, steered N.N.E. This bay he called Botany Bay, from the quantity of plants found there by Mr. Banks and Dr. Solander. In the logs the bay was entered as Stingray Bay, no doubt from the large stingrays found there. While in Botany Bay Captain Cook and parties constantly landed and made excursions, and men were employed in cutting wood, obtaining water, and fishing. Natives were seen and presents left for them, but they avoided the white men and only seemed anxious that the latter should go away. Some conversation went on from a distance, but Tupia could not understand a word. The natives were armed with darts, and possessed some primitive canoes. They are also said to have had wooden swords, but I suppose these were really clubs. Dr. Solander had sight of a small animal, and found traces of one that fed on grass and which was thought to be a deer, but was probably a kangaroo.

On leaving Botany Bay Captain Cook soon passed, at a distance of two or three miles, what appeared to be a safe anchorage, which he called Port Jackson after Mr. Jackson,

then one of the secretaries to the Admiralty. This is, of course, the famous Sydney Harbour, and Cook's chart gives the shape of what he could see very accurately, but the main arm of the harbour is hidden from the sea.

The progress now made was very slow. On the 7th May some broken land was seen that appeared to form a bay to which Cook gave the name of Broken Bay, and a little further on he observed some high land, which projected out in three bluff points which occasioned him to call it Cape Three Points. On the 8th the latitude was the same as on the previous day, owing to the fresh northerly breeze. On the 11th there was a southerly wind, and in the afternoon a low rocky point was passed, to which Cook gave the name of Point Stephens after one of the secretaries to the Admiralty, and on the north side was an inlet which appeared to be sheltered from all winds. Cook called this Port Stephens. Next morning the vessel was abreast of a high point of land with two hillocks. This point he called Cape Hawke after the First Lord of the Admiralty, Sir Edward Hawke. Cook records that constantly along the coast the smoke of native fires was observed.

At sunset on the 12th three remarkable large high hills were observed near each other and not far from the shore. To these hills Cook gave the name of The Three Brothers. On the 13th a point or headland was passed, on which were fires that caused a great quantity of smoke, so Cook gave it the name of Smoky Cape. Cook describes the nature of the coast land as he goes along, but I must reserve all long references on this subject until we reach Queensland.

On the 15th a tolerably high point of land bore N.W. by W., distant three miles. This point he named Cape Byron, latitude 28° 37' 30" S., longitude 206° 30' W. The name was given after Captain John Byron,* one of Cook's predecessors in exploration in the Pacific, who sailed round the world in H.M.S. *Dolphin* in company with the *Tamar* in 1764-66. Cape Byron may always be known, Cook remarks, by a remarkable sharp-peaked mountain, lying inland N.W. by W. from it. Here they passed outside breakers at a distance of about a league.

* "Foul Weather Jack," afterwards Admiral, father of John Byron, "Mad Jack of the Guards," author of the very remarkable "Narrative" referred to by his grandson Lord Byron in Don Juan as "My Grandad's Narrative."—C. ii. st. 137.

He states that these breakers were in latitude 28° 8' S, and stretched off two leagues from a point under which is a small island. He adds that the position of these breakers may be found by observing the peaked mountain just mentioned, which bears from them S.W. by W. This peak he named Mount Warning, and I fancy most of you have seen this conspicuous hill from the deck of a steamer on the voyage to or from Sydney. Incidentally, I may remark that I am astonished that so few persons in Brisbane have ever made that very pleasant trip, easily accomplished in four days, across the Macpherson's Range viâ Nerang, to Murwillumbah, on the Tweed, and near Mount Warning, then dropped down the Tweed River to the coast, returning along the splendid beach from Coolungatta, viâ Burleigh Head to Southport, and thence home by rail. It is a charming trip, and every facility is afforded for it by coach and rail, and by steam launch on the Tweed. I have only heard of one Brisbane gentleman having ascended Mount Warning since I have been here.

Cook gave the name of Point Danger to the point off which these shoals lay, and, on the 16th May, after a voyage which had lasted twenty-one and a-half months Cook reached what was to be the Southern boundary of that Colony in which we live, and which we are proud to call Queensland, and names will now be familiar to us. At noon Cook was about two leagues from the land, and by observations in latitude 27deg. 46min. and longitude 206deg. 26min., while Mount Warning bore S. 20deg. W., distant about fourteen leagues.

On the 17th he steered along shore North three-quarters East at a distance of about two leagues, and between 4 and 5 o'clock discovered breakers on his larboard, or as we now call it, port bow. At sunset the northernmost land in sight bore North by West, the breakers North-west by West distant four miles, and the northernmost land set at noon which formed a point he called Point Lookout. It bore West distant five or six miles. Cook says: "On the north side of this point the shore forms a wide open bay, which I have named Morton's Bay, in the bottom of which the land is so low that I could but just see it from the topmast head. The breakers I have just mentioned lie about three or four miles from Point Lookout. At this time we

had a great sea from the southward, which broke prodigious high upon them." The northernmost land Cook saw at night he named Cape Morton. It is to be observed that Cook spells the word Morton without an e. This is apparently accurate, for the name was given after the Earl of Morton, in which word there is no e. The Earl of Morton was President of the Royal Society in 1764, and one of the Commissioners of Longitude. How or when the e came to be inserted as it is in present use I do not know. Certainly the Earls of Morton to the present day spell their name without an e.

From Cape Morton the land trended more to the West than could be seen, and there was a small space where no land was visible, and some on board thought there was a river. This point was not cleared up, as the wind was favourable; but Cook remarks that any one desirous of ascertaining whether there is a river or not can always find the place by seeing the three hills to the northward in latitude 26deg. 53min. S. Cook called these hills, which are so familiar to us and which he thought remarkable on account of their singular form, the Glass Houses, as they resemble what in those days were called glass houses, not because the houses were made of glass, but because of their being used and having furnaces for the making of glass. He noticed other hills inland, but not such remarkable ones.

By observation on the 17th, the vessel was ten miles to the northward of the log reckoning—a difference more than had previously occurred on the coast. From noon on the 16th to noon on the 17th the *Endeavour* had made eighty miles, the course being N. by W. Here they saw at a distance of two or three leagues a low bluff point on the southern side of an open bay, which Captain Wharton states are the present Low Bluff and Laguna Bay respectively. They saw the smoke of several fires, not only on the coast but also pretty far inland. The point set at night of the 17th bore S.W. by W., distant three leagues, and Cook named it Double Island Point, on account of its figure, which gives it the appearance of two small islands lying under the land. He also says it may be known by the white cliffs on the north side of it. From this, Cook says, the land trends away to the North-west and forms a large bay,

in the bottom of which the land appeared to be very low. This bay is the present Wide Bay. Cook describes the land thereabouts as more barren than any he had seen on that coast and there were few signs of inhabitants. At this time many birds were seen, of a kind that Cook did not remember to have observed elsewhere, and, as he says, of the kind called "boobies." From before sunrise to half an hour after, flights of them were continually coming from the N.N.W., and flying to the S.S.E., and not one of them was seen to fly in any other direction. From this Cook surmised that there was a lagoon or river or inlet of shallow water to the southward, to which these birds resorted in the day, and that not far to the northward lay some islands, to which they retired in the night.

On the 20th, the *Endeavour* passed, at a distance of four miles, a black bluff head, or point of land, on which a number of natives were assembled, so Cook named it Indian Head; the land generally was low, and people were seen in various places, and smoke in the day and fires at night. At daylight breakers were discovered, which reached close to the land upon the lee bow. The vessel edged away N.W. and N.N.W. alongside of the shoal, at a distance of one or two miles. At noon the vessel was in latitude 24deg. 26min. S., and the extreme point of the shoal bore due S. $\frac{3}{4}$ W., distant twenty miles. Cook named this point Sandy Cape, on account of two very large patches of white sand upon it. As you know, this is the northern point of Great Sandy Island. Sending a boat ahead to sound, the vessel crossed the tail of the shoal in six fathoms, but the water very soon increased to twenty fathoms. He called this shoal Breaksea Spit, because as he states, "we now had smooth water, whereas on the whole coast to the southward of it we always had a high sea or swell from the south-east."

On the 22nd May the vessel stood in to the shore and bore away along it N.W. by W., at a distance of about two leagues. Near the sea the land was low, but inland moderately sized hills were seen, and the whole appeared to be thickly clothed with wood. The water was rather shoal, and Cook anchored in eight fathoms, four miles from land. Next day, the 23rd, he continued his course; at 5 o'clock was abreast a large open bay, and anchored at 8 o'clock in five fathoms with a sandy bottom.

Next morning Cook continued his course and anchored at 8 o'clock in a large open bay. He landed with a small party and saw no people but several smokes, but all all too far off for him to visit them, excepting one where he found ten small fires close together, with some cockle-shells lying about, but he saw no people. On the windward or south side of one of the fires was stuck up a little bark about a foot and a-half high, and some few pieces lay about in other places. These, he concluded, were all the shelter they had in the night. Tupia, the Tahitian, said that the people were *taata ino*—that is, bad or poor people. Cook thought this place, which I may remark is the first at which he landed in what is now this Colony, to be visibly worse than the last place he was at, which was Botany Bay. He says that here the soil was dry and sandy, and the woods free from underwoods of every kind, but there were trees of the same description as they saw at Botany Bay, with a few other sorts. He tried to take the boats up a lagoon here, but the water was too shallow. On the skirts of the lagoon he found the true Mangrove, such as is found in the West Indies, and which he had not seen before in this voyage. He also found a sort of palm tree, which grows in low, barren, sandy places in the South Seas. He saw most of the land and water fowl he had observed in Botany Bay and some bustards, one of which was killed and weighed seventeen and a-half pounds. This caused him to give the name of Bustard Bay to the place. He also saw black and white ducks, some small oysters sticking to the rocks, stones and trees, and mussels, pearl oysters and cockles.

Next morning he made sail out of the bay, and when abreast of the north point Cook discovered breakers stretching out from it about N.N.E. two or three miles, with a rock just above water at the outermost point.

At daylight on the 25th May, which according to our reckoning was the 26th, land was seen, looking like islands bearing N.W. by W., and at 9 a.m. the *Endeavour* was abreast of a point and distant from it a mile in fourteen fathoms of water. Cook found that this point lay directly under the Tropic of Capricorn, and therefore gave it that name. On the west side Cook thought there was a lagoon and on two spits which formed the entrance were many pelicans. The most northern

land to be seen from here bore from Cape Capricorn N. 24degs. W. and appeared to be, and indeed was, an island called Hummocky Island, but the mainland trended W. by N., which course they steered, passing low and sandy land near the sea, except the points which are moderately high and rocky. Inland, he states, the country is hilly, and affords but a very indifferent prospect.

Cook anchored on the afternoon of the 26th four leagues from the coast, having the mainland and islands in a manner all round. Cook was now within the large chain of islands and reefs, called the Barrier Reef, which run up to Torres Straits, but was then unaware of their existence. In the morning he weighed and passed between the outermost range of islands and the mainland. At noon the latitude was 23deg. 7min. S. and the vessel was eighteen miles west of Cape Capricorn. The mainland here Cook describes as tolerably high and mountainous, and the islands pretty high and of small circuit. Smokes were observed and Cook concluded that there must be a river or lagoon or inlet, and he says he passed two places that had the appearance of such this morning, but the depth of water was small and he did not like to stand in nearer to the shore for the purpose of observation. Indeed he soon found that he was in sixteen feet of water, which was only two feet more than the ship drew, and he sent away boats to sound, by which means a passage was found and on the morning of the 27th the vessel made sail to the northward. Captain Wharton says this passage was between Great Keppel Island and Little Keppel Island. At noon the northernmost point of land visible bore N.N.W., distant ten miles and Cook called it Cape Manifold from the number of high hills over it. Between these points the shore forms a large bay which Cook called Keppel Bay and he gave the name of Keppel also to the islands. He records that there "is good anchorage wherever there is a sufficient depth of water; what refreshment it may afford for shipping I know not. It can hardly be doubted but what it afforded fresh water in several places, as both mainland and islands are inhabited. We saw smokes by day and fires by night from the maintop and people upon one of the islands."

The *Endeavour* passed Cape Manifold at 3 p.m. on the 28th,

and Cook describes the cape and the islands near it. At 6 in the evening Cook brought to, and at daylight made sail again, Cape Manifold bearing S. by E., distance eight leagues. The furthest point of the mainland bore N. 67deg. W., distant twenty-two miles, but islands were seen to the northward of it, four or five leagues out at sea. At 9 a.m. the vessel was abreast of the point which he named Cape Townshend, after Charles Townshend, who was Chancellor of the Exchequer in 1767. At three or four leagues to the south-east he states the shore forms a bay, in the bottom of which there appeared to be an inlet or harbour. This is what is called Shoal Water Bay. On rounding the cape, the vessel hauled her wind to the westward, to get inside the islands, which Cook says, "are scattered up and down in this bay in great numbers, and extend out to sea as far as we could see from the masthead." Shoal water was soon met with, and the ship was tacked to avoid it, and sent a boat ahead to sound. A little before noon the water suddenly shoaled, and the *Endeavour* anchored in three and a-half fathoms. The vessel had been carried upon this shoal, which is now called the Donovan Shoal in Broad Sound Channel, by a strong current setting to the N.W. by W. ½ W. at the rate of between two and three miles an hour. In the afternoon, as he found there was sufficient water, Cook passed over the shoal, and at 6 p.m. on the 29th anchored in ten fathoms with sandy bottom. Here he remained until 6 a.m. of the 31st May. Cook hoped here to find fresh water, and desired to lay the ship ashore to clean her bottom, and he explored the coast. He found suitable places in which to lay her ashore, but did not do so, as he could find no fresh water, and the country seemed to afford no sort of refreshment. Only two natives were seen at a distance, but there were traces of others and smokes at a distance. Cook saw no sign of fertility. He named the inlet which he visited Thirsty Sound. When he landed at the entrance of the inlet he found his azimuth compass greatly affected, and as the loose stones which lay on the ground did not affect the needle, he concluded that the disturbance arose from the iron ore upon the hills, signs of which he saw in several places.

Cook now stood to the north-west and passed outside the

islands which lay inshore, but at the same time had a number of islands outside, the northern inland islands extending as far as could be seen. Feeling his way carefully along, he came to an anchor under the lee of three small islands, now called the Bedwell Islands. The vessel was put under sail again at 7 a.m. on the 1st June, and stood to the north-west, and now had the western inlet beforementioned and called Broad Sound, all open, nine or ten leagues wide at the entrance, with several islands lying in and before it. At noon the latitude was 21deg. 29min. S., and a point of land which forms the north-west entrance into Broad Sound bore W., distant three leagues. This point Cook called Cape Palmerston, after the then Viscount Palmerston, a Lord of the Admiralty. Between this cape and Cape Townshend lies what Cook called the Bay of Inlets, but this name has disappeared from the charts. Captain Wharton says that Cook "applied it to a whole mass of bays in this locality, covering over 60 miles," and he adds, "to look at a modern chart causes amazement how Cook managed to keep his ship off the ground, as the whole sea in his track was strewed with dangers."

At noon on the 2nd the vessel was in 20deg. 56min. S., and a pretty high promontory bore W. ½ N., distant seven miles. This he called Cape Hillsborough, after Lord Hillsborough, who was First Secretary of State for the Colonies when Cook had sailed. Cook says: "The mainland here is much diversified with mountains, hills, plains and valleys, and seemed to be tolerably clothed with wood and verdure." The islands parallel with the coast, which are called the Cumberland Islands, he remarks, are of various height and circuit. He saw same smokes on the mainland.

At daylight on the 3rd, Cook got under sail and discovered an opening, which proved to be a bay five or six leagues deep, and he stood into a passage between the mainland and an island (Whitsunday Island). At noon the north point of the bay, which he called Repulse Bay, bore S. 19deg. W., distant four miles. The point he called Cape Conway, after General Conway, Secretary of State from 1765 to 1768. During the afternoon he steered through the passage, which is formed by the mainland on the west and by islands to the east. Cook

says: "The land on the mainland and islands, especially on the former, is tolerably high, and distinguished by hills and valleys, which are diversified with woods and lawns that looked green and pleasant." He says that the anchorage in the passage was everywhere good. On a sandy beach on one of the islands he saw a canoe with an outrigger, which appeared to be larger than those he had previously seen on the coast, and differently built. By 6 p.m. the vessel was nearly out of the passage, and he kept at the distance of three leagues from the land, under easy sail, sounding all night. Cook says: "This passage I have named Whitsunday Passage, as it was discovered on the day the Church commemorates that festival, and the isles which form it Cumberland Islands, in honour of His Royal Highness the Duke of Cumberland." At daylight the vessel was abreast of a point which Cook called Cape Gloucester, after the Duke of Gloucester, a younger brother of King George III. This cape may be known, Cook says, by an island which lies out at sea N. by W. ½ W. five or six leagues from it. He called this Holbourn Island, after an Admiral who commanded the fleet in which Cook served in 1757. From Cape Gloucester the land trended south and south-south-west, and formed a deep bay with very low land at the bottom. He called this Edgcumbe Bay. In this bay the town of Bowen now lies. Cook continued his course to the westward and had high land in sight, which bore from him W. by N.½N. At 6 o'clock next morning he was abreast of this point, which he called Cape Upstart, as it is surrounded by low land from which it starts up singly. This point is about fourteen leagues W.N.W. of Cape Gloucester. Under Cape Upstart Cook observed a considerable variation in the needle, and "judged that it was owing to iron or other magnetical matter lodged in the earth."

Cook next passed a bay which he called Cleveland Bay, and the east point of it he named Cape Cleveland, and the west point Magnetical Head or Island, as he said it had much the appearance of an island, as we know it is. The compass did not traverse well when near it. He remarks on the rugged rocky and barren appearance of the land, but he judged that there were inhabitants from the smokes he saw.

On the morning of the 7th the *Endeavour* was abreast of a

group of islands, now called Palm Islands, and as Cook saw people and canoes, and, as it was thought, cocoanut trees upon one of the islands, a boat was sent ashore to see what could be procured, but the trees turned out to be only a small kind of cabbage palm. Some of the natives were heard but none were seen. Cook then stood away N. by W. for the northernmost land in sight, and was abreast of it at three in the morning of the 8th. He named it Point Hillock, on account of its figure. It is the east point of Hinchinbrook Island. The bay which lies between this and Cape Cleveland he called Halifax Bay, after a Secretary of State. Three hours later he was abreast of a point which he called Cape Sandwich, after Lord Sandwich, a First Lord of the Admiralty, and the land then trending west and afterwards north formed a fine bay, which he called Rockingham Bay, after the Marquis of Rockingham, Prime Minister in 1765-66. Cook could not wait to land, but sailed along the shore to the northward in the direction of some small islands, which he passed through, now known as the Family Islands. On one of these a number of natives were collected, looking attentively at the ship. They were quite naked and of a dark colour.

The vessel kept under easy sail on the night of the 9th at a distance of three or four leagues from the land, and in the morning was abreast of some islands, which he called the Frankland Islands, and later on the vessel passed between what is called Fitzroy Island and the mainland, and by noon was abreast of a high point, which Cook named Cape Grafton, after the Duke of Grafton, who was Prime Minister when Cook sailed. The *Endeavour* anchored about three miles to the westward of the cape, and Cook landed, but as no fresh water was found convenient, or any other refreshment, Cook weighed at midnight and stood away to the north-west and passed islands called Low Island and Snapper Island. Cook called the bay, which is formed by Cape Grafton and the next point of land, Trinity Bay, after the day on which it was discovered, and the northern point he called Cape Tribulation, as here began his troubles.

Without mentioning the various islands he passed it is sufficient to say that standing on sounding and in tolerably deep

water with all hands at their stations at a little before 11 p.m. on the 11th the ship struck and stuck fast. Every effort was made to get the ship off and some forty or fifty tons weight of articles were thrown overboard, but it appeared that it was the top of high water when the ship went ashore. At 11 a.m. efforts were made to heave the ship off, the stream anchor and coasting anchor having been carried out, but without success, she not being afloat by a foot or more, and as the tide fell the ship began to make water and had a heel of three or four streaks to starboard. Two pumps had to be kept going. Fortunately there was little wind and a smooth sea, but as the tide rose in the afternoon of the 12th the leak increased and a third pump had to be worked. At 9 at night the ship righted as the tide rose, but the leak gained upon the pumps considerably and the situation became alarming. Cook determined to risk all and heave her off if possible, so he turned as many hands to the capstan and windlass as could be spared from the pumps. At about 20 minutes past 10 o'clock the ship floated and was hove into deep water, having three feet nine inches of water in her hold. Cook then sent the longboat to take up the stream anchor, which was effected, but the cable was lost among the rocks. All hands then turned to the pumps as the leak was increasing, but by 8 o'clock in the morning the leak was being gained on and at 11 a.m. the vessel was put under sail and stood for the land; the pumps were going and gaining on the leak and preparations made by sewing oakum, wool, etc., into a sail to fother the ship, that is, to put a specially prepared sail under the vessel. In the afternoon this was effected, the sail being put under the starboard main chains where the ship was suspected to leak most, and soon after it was found that one pump could keep the ship clear. When this was accomplished the spirits of all were raised, and it was hoped that some harbour might be found where damages could be repaired. As Captain Wharton says, "the situation was indeed sufficiently awkward. When it is considered that the coast was wholly unknown, the natives decidedly hostile, the land unproductive of any means of subsistence, and the distance to the nearest Dutch settlement, even if a passage could be found south of New Guinea, 1,500 miles, there was ample cause for apprehension if they could not save the ship."

On the 14th June the master was sent ahead to sound and to look out for a harbour where the ship could have defects repaired and be put in proper trim, and at 8 o'clock one of the mates returned to the ship and reported that they had found a good harbour about two leagues to leeward. This was the present Cook Harbour on the Endeavour River. On the 15th and 16th there were strong gales, and some people were seen on shore, but it was the morning of the 18th before it was possible to run into the harbour and in doing this the vessel ran ashore twice. She was floated at 1 p.m. and was warped into the harbour and moored alongside of a steep beach.

Stores were then landed; the sick, eight or nine in number, placed in a tent; a forge set up, and other preparations made, and on the 22nd the vessel was warped a little higher up the harbour to the place Cook fixed upon to lay her ashore to stop the leak, she then drawing 7 feet 9 inches forward and 13½ feet aft. It was the 4th August before the vessel left the Endeavour River.

Of course Cook's first care was to examine and repair as far as was possible all damages, and these were very serious. Indeed it was a wonder the vessel had escaped at all, and at the end of all the work she was not without serious defects. All that men could do with limited means was effected. Then various exploring expeditions were made inland in different directions for three or four leagues; the hills were mounted and views obtained oceanwards, which were not encouraging, for islands or reefs seemed to bar all passage to the north, the direction in which Cook wished to go, while the wind was almost constantly from the south and would render retracing his way almost impossible. He had, moreover, only three months' provisions left. Boats daily went out to bring in fish and turtle, and to sound all passages through the reefs. Greens of various sorts were collected for the men, and some pigeons and other birds were shot. Whatever refreshment was obtained that admitted of division, it was equally divided to all, from the Captain to the seamen. When the quantity was small, it was given altogether to the sick. Cook's account of the Endeavour River and its neighbourhood is very full; his chart of the harbour is interesting. Natives were seen frequently, and somewhat friendly relations

at times established, but on occasions they were very troublesome and mischievous. Here kangaroos were seen, it is believed for the first time, by Europeans, and are described with tolerable accuracy. One or two were shot. The name was taken by Mr. Banks from the natives. The natives spoken to or seen were never above 5½ feet high, with small limbs. Their hair was black, lank and cropped short. They were quite naked; their skins the colour of wood soot, and none of their fore teeth were wanting, as was the case with those seen by Dampier on the western side of Australia. Some of their bodies were painted red. Their features were far from disagreeable, and their voices were pleasant. They could easily repeat any words spoken to them, but none of Cook's people or Tupia could understand one word they said.

Cook gives a full account of the Endeavour River and country near it.

After putting out to sea Cook encountered great risks owing to the numerous and difficult shoals, and boats were constantly ahead sounding and observing. Cook himself landed on the 12th August on an island, which he called Lizard Island, and ascended a hill whence he saw a reef of rocks extending in a line N.W. and S.E. further than he could see, on which the sea broke very high. This was the outward ridge of the Barrier Reef. Cook was much disappointed with his observation, but he found some fresh water and also ruins of huts and some shells, which showed that natives resorted there at certain seasons.

On the 14th the *Endeavour* passed through a channel which lies N.E. ½ N., three leagues from Lizard Island. The channel, which is now known as Cook's Passage, was about one-third of a mile broad and twenty-five to thirty fathoms deep. The moment the vessel passed outside the breakers there was no bottom at a hundred fathoms, and a high sea came rolling in from the south-east. By this Cook says: "I was well assured we were outside all the shoals, which gives us no small joy, after having been entangled among islands and shoals, more or less, ever since the 26th May, in which time we have sailed above 360 leagues without ever having had a leadsman out of the chains when under sail—a circumstance that perhaps never happened to any ship before, and yet it was here absolutely necessary."

When outside the channel the vessel was headed E.N.E., and the large hollow sea into which it came now showed that the ship had received more damage than was previously thought, and one pump had to be kept constantly at work.

On the 16th the vessel had a very narrow escape from wreck, being nearly carried on to a reef on which the sea broke tremendously, and the *Endeavour* was only saved by a small air which sprung up, when, aided by boats and sweeps, a passage was managed through another opening and the vessel was again inside the Barrier Reef. As Cook says, it was but a "few days ago that I rejoiced at having got without the reef, but that joy was nothing when compared to what I now felt at being safe at anchor within it." Cook was much impressed with the danger of one ship alone being engaged in these explorations, and in his subsequent voyages he asked for and obtained two vessels.

On the 17th a pretty high promontory was observed, which Cook called Cape Weymouth, after Viscount Weymouth, who was a Secretary of State. On the 18th boats sent to a reef returned with two hundred and fifty pounds of cockle-shell meat. Some of these shells were as large as two men could move, and contained about twenty pounds' weight of very good meat. You have all seen some of these shells, no doubt.

After passing many shoals and islands, which I need not mention in detail, the *Endeavour* reached the promontory which is the Northern point of Australia, and which Cook called Cape York. Some islands were close by, which Cook called York Islands, now called Mount Adolphus Islands, and Cook passed between them and the mainland, and was not very far from the rock on which the *Quetta* struck and was destroyed in 1890. Within the entrance Cook anchored, and, landing on an island, took a survey from the highest hill, and satisfied himself that there was probably a passage through, and that there was no need for more landing on the east coast of Australia, while on the western side he could make no discovery, as the honour of such already belonged to Dutch navigators. He was confident that the east coast from 38deg. South to where he now was in latitude 10deg. 43min. had never been visited by any European, and notwithstanding he had before, in the name of His Majesty, taken possession of several places upon this coast, he once more

hoisted English colours, and in the name of King George III. took possession of the whole eastern coast. From the above latitude of 38deg. to this place he gave the name of New Wales, together with all the bays, harbours, rivers, and islands situated upon the said coast, after which three volleys of small arms were fired and answered from the ship. The island was called Possession Island, and about here and on the mainland a good many natives were seen. The point he named Cape Cornwall was passed on the 22nd August, and later on a small island, now called Booby Island, was just in sight, bearing N.W. ½ W. The channel through which Cook passed is called the Endeavour Strait. It is, however, little used now on account of the great bank which nearly bars its western part. As there is a deep though narrow channel north of Prince of Wales Island, the other passage is abandoned. As Captain Wharton says, the passage of Torres Straits is still an anxious bit of navigation. About noon on the 23rd the vessel was within a mile of Booby Island, and as there was little wind, Captain Cook and Mr. Banks landed on it and found it to be mostly a barren rock with a few birds on it, chiefly boobies, from which Cook named the island. It is now the great landmark for ships making Torres Straits from the westward, and there is a light upon it maintained by the Queensland Government.

Cook had now no doubt that he had got to the westward of Carpentaria, or the northern extremity of New Holland, and had an open sea to the westward, which gave him much satisfaction, and proved that New Holland and New Guinea are two separate lands or islands, which, up to that time, had been a doubtful point.

At Booby Island Cook may be considered to have finally left the shores and islands of what we call Queensland—the coast of which he arrived off on the 16th May, 1770, and left on the 23rd August. This includes the detention of nearly seven weeks in the Endeavour River.

It is very remarkable, considering the length of time the vessel had been at sea, and the very small refreshment that was obtained on the Queensland coast, not one man died in the whole crew. Indeed, from the time the vessel left Plymouth on the 26th August, 1768, until October, 1770, a period of two years and

two months, only three men died, but three were drowned and two negro servants frozen to death. This rate of mortality, which was extraordinarily low under the circumstances, was not to last throughout the voyage.

As Cook now left Queensland and steered for the New Guinea coast, I must be very brief with the rest of this voyage. Leaving Booby Island on the 23rd August, the land of New Guinea was seen from the masthead, bearing W.N.W.; and standing off for the night, at 6 a.m. on the 29th August a small island was seen in latitude 8deg. 13min. S., and longitude 221deg. 25min. W. Cook says this island is laid down on the chart as St. Bartholomew or Whermoysen and is near the Princess Marianne Strait which is between the Main Island and Prince Frederick Henry Island. Shoal water caused much difficulty, and even now the charts are very imperfect; but pursuing a course mainly to the north, on the morning of the 3rd September Cook went ashore, accompanied by Mr. Banks and Dr. Solander, having as he says "a mind once to land in this country before I quit it altogether, which I am now determined to do without delay, for I find it is only spending time to little purpose and carrying us far out of our way, staying upon this coast which is so shallow that we can hardly keep within sight of land." As soon as they landed they heard the voices of natives before some appeared, and at last they were followed by about sixty and had to fire on them, after which the natives allowed Cook and his party to retire to their boats without molestation. The natives had darts and carried hollow canes with tinder for making fire. These at first Cook's people thought were firearms, as smoke came from them as they swung them round. Cook's landing place was in 6deg. 15min. S. on the western side of New Guinea. The coast here was luxuriously clothed with woods and verdure. Cook was urged by some of his officers to remain and cut down some of the cocoanut trees for the nuts, ut he wished to avoid the possibility of collision with the natives, and in the leaky state of the ship he desired to reach Batavia early and did not think it worth while to delay for any purpose of discovery, for he knew from charts published by the French in 1756 that the Spaniards and Dutch had at one time or another visited the whole of New Guinea,

though there was still a doubt as to whether New Holland and New Guinea were not one continued land until Cook cleared it up.

On the 10th September Cook saw the Island of Timor and coasted along it for some days, and on the 17th, being much pressed by his people to obtain refreshments, he with difficulty obtained some at the Island of Suva, which was under Dutch control, and he entertained the Dutch Governor on board. Leaving Suva on the 21st September and passing through the Straits of Sunda, the *Endeavour* anchored in Batavia Roads on the afternoon of the 11th October.

Cook remained at Batavia until the 26th December, repairing and refreshing, meeting very serious hindrances from the Dutch authorities and paying heavily for everything. The season was very unhealthy, and when the *Endeavour* left Batavia, she was, as Cook says, in the condition of an hospital ship, and whereas only three men had died in the twenty-six months prior to arrival at Batavia, seven died at that place, and the seeds of disease were taken away so that eleven men died in the following month of January, 1771, and ten in the month of February, after which there were only five deaths in all.

Cook reached Table Bay, Cape of Good Hope, on the 14th March, 1771, and remained until the 15th April, when he left in company with other ships, anchored at St. Helena from the 2nd to the 6th May, saw land near the Land's End on 11th July, and on the 13th was abreast of Dover, where he landed in order to repair to London. Thus ended this remarkable voyage, after having lasted more than three years from the commissioning of the ship.

To those who wish to read in detail Cook's very interesting Journal, I commend the perusal of this book, which I have great pleasure in presenting to this Society.

Of ninety-four souls who left England in the *Endeavour*, fifty-eight returned. Of those who died, three were drowned, thirty-one died after reaching Batavia—most of them from fever and dysentery contracted at that place. The vessel was sold in 1775, and sailed as a collier in the North Sea for many years.

I can only say a few words about Cook's subsequent career. In the November following his return he was appointed to the

Resolution, and with her and the *Adventure*, both Whitby-built colliers, of 462 and 336 tons respectively, he was directed to explore the whole region about the South Pole, starting from the Cape of Good Hope and sailing eastward. The winter in the Southern Hemisphere was to be spent as Cook thought fit. Some alterations had to be made in the vessels, and the expedition did not leave Plymouth until the 13th July, 1772. This voyage, in which Cook penetrated to 67deg. of south latitude, lasted three years and eighteen days, Cook reaching Plymouth on 31st July, 1775, after most careful explorations and some discoveries in the South Seas. By Cook's precautions scurvy was again avoided, and his services were so much appreciated that he was promoted to Captain and elected a Fellow of the Royal Society.

Cook was again sent away in July, 1776, in the *Resolution*, accompanied by the *Discovery*, a vessel very similar to the *Adventure*, Cook's consort on the previous voyage. His orders were to the effect that he was to proceed by way of the Cape of Good Hope to search in the Indian Ocean for the land recently seen by M. Kerguelen ; thence *via* Tahiti on to the coast of North America in about latitude 45deg., which he was to follow to about latitude 65deg., searching especially for any channel which might lead to the south-east, as it was supposed there might be a passage communicating with Hudson's Bay. He was further to look for any passage north of North America to the Atlantic, and to make such other explorations as might seem fit to him. A money reward of £20,000 was also offered in case of his success in finding such a passage.

This voyage, as you are aware, was never completed, and you are no doubt acquainted with the circumstances under which he was most unfortunately killed at Kealakekua Bay, in the Sandwich Islands, on the 14th February, 1777.

I am quite unable for want of time to quote all that has been said of Cook by those who served with him, or were in some way well acquainted with his character and achievements. One passage that seems to me most touching and convincing is that of Captain King, who was serving under Cook at the time of his death. It is to be found at page 49 of the introductory part of this book. Cook was a born explorer, allowed no difficulties to

turn him aside, and he took personal pains in everything. This latter quality is especially observable by the manner in which health was preserved in vessels he commanded. Other ships had the same provisions and comforts and yet had scurvy. He insisted in all lands on finding greens of some kind for his men, and boiling them with their ordinary food. He kept the decks clean by constant washing and then drying below with hot stoves. He required wet clothing to be changed and all bedding to be aired, though all this was repugnant to the seamen of the day, and it required constant supervision to enforce the adoption of these odd foods and customs.

I think I have in this imperfect sketch shown that nothing could be further from the truth than the sneer about Cook contained in the newspaper extract I read to you at the beginning of this lecture, and I cannot conclude better than by quoting the last portion of the sketch of Cook's life given by Captain Wharton:—

"Cook did more, incomparably more, than any other navigator to discover new lands. This was only accomplished by dint of hard work; and yet his men suffered less than in any ships, British or foreign, in similar expeditions. Though his tracks were in new and unknown waters we never hear of starvation; he always manages to have an abundant supply of water."

"The completeness and accuracy of his charts are no less remarkable."

"M. de La Perouse, one of the foremost of the great French navigators, told Captain Phillip, the founder of the colony of New South Wales, that Cook had left him nothing but to admire. This was all but literally true; that wherever Cook went he finished his work according to the requirements of navigation of his time. He never sighted a land but he determined its dimensions, its shape, its position, and left true guides for his successors. His charts are still for some parts unsuperseded, and his recorded observations still save us from hasty and incorrect alterations desired by modern navigators. Well may Englishmen be proud that this greatest of navigators was their countryman!"

So says the distinguished officer who is head of the Hydrographical Department of our Admiralty, and I think you will agree in this estimate and earnestly desire that some one may come forward with equal zeal, enthusiasm for exploration, and good judgment combined with scientific skill that Cook could not have possessed, and be made use of for that Antarctic exploration which all geographers desire, which is ready to our hand and which we in Australia may be looked to to specially advocate and support.

Antarctic Exploration.

By Major A. J. Boyd, *Hon. Sec.*

[Read at a Meeting of the Society, August 31, 1895.]

The interest which is again being exhibited in Polar exploration amongst the scientific societies all over the world is a hopeful sign that the further exploration of the Arctic regions will not occupy the attention of scientists to the exclusion of the Antarctic *terra incognita.* We in Australasia have a special interest in promoting by every means in our power the fitting out of expeditions to make fresh discoveries south of latitude 78 deg., and to make further valuable additions to our geographical knowledge, and doubtless also to the commerce of the colonies. How much we have yet to learn concerning the atmospheric phenomena, concerning the fauna and flora of these unknown regions! How imperfect is our knowledge of the meteorology of the Antarctic! Whilst our meteorological observers are enabled to forecast to a certain extent the probable atmospheric changes all over Australasia and the well-known portions of the South Pacific, they are greatly in the dark as to the disturbing causes which operate to alter certain conditions in the high latitudes. Doubtless the establishment of meteorological stations in suitable situations within the Antarctic circle would be fraught with difficulty, but it is in overcoming difficulties that science glories, and it is quite possible to construct instruments which would be self-registering and would only require attending to at long intervals. South of latitude 40 deg. there exists a belt of low pressure that encircles the globe, the barometer sinking to 29 deg. in latitude 60 deg. This occurs in no other part of the world. Mr. Bruce and Dr. Donald found south and south-east and east winds prevailing in these latitudes, showing that the area of low pressure does not extend, as some scientists maintain, over the South Pole, but that the South Pole, like the North Pole, was situated in the midst of an anticyclonic area. What do

we know of the animal and vegetable life beyond the parallel of 78 deg. south? What of magnetism and the south magnetic pole? What of geology and fossil remains? Do we know of the existence of an Antarctic continent? Various explorers have mapped out portions of the land, but is this land connected with a mainland? This problem has yet to be solved. The Arctic regions have been exploited by navigators of most European nations, but it was only lately that Greenland was discovered to be no peninsula. We have thus first of all to extend our knowledge of the Antarctic continent, of its islands, volcanoes, inland seas, &c. Then we have to connect our knowledge of the atmospheric conditions obtaining in Australasia with those of the regions south of existing meteorological stations. The fact of the three great Antarctic disturbances which our eminent meteorological observer, Mr. Clement L. Wragge, has lately predicted, moving along our southern coasts, points to the desirableness of establishing stations beyond the limits of the pack-ice. The volcanic disturbances in New Zealand show the necessity of examining the neighbourhoods of Mounts Erebus and Terror, so that it may be determined whether these disturbances affect the Australasian colonies as a consequence of volcanic or seismatic action in the Antarctic. Then the commercial aspect need not be lost sight of. There is abundant evidence that a rich harvest is to be gleaned in the whaling and sealing industry, and even on this ground we may fairly base a claim to the assistance of the various Australasian Governments in the way of a subsidy in aid of the fitting out of an expedition to determine these and many other questions. How many discoveries had been made on the Australian coast before Cook connected the various isolated headlands and bays, and proved that Australia was not a mere collection of islands, but a vast island continent? Let us consider for a moment the discoveries made in Antarctica. Passing over the supposed discovery of a continent by Kerguelen in 1772, when he reached the latitude of 49 deg. S., and on a second expedition found that he had only discovered an island which is known as Kerguelen's Land, we come to Cook's voyage in the same year. His mission was

to determine whether a southern continent existed or not. He traversed the Southern Ocean, and attained the high latitude of 71 deg. 10 min. S., longitude 106 deg. 54 min. W. In his own words, we find that no continent could be in existence unless it were within the Antarctic circle. "It is," says he, "true, however, that the greatest part of this southern continent (supposing there is one) must lie within the Polar circle, where the sea is so pestered with ice that the land is thereby inaccessible. The risk one runs in exploring a coast in these unknown and icy seas is so very great, that I can be bold enough to say that no man will ever venture farther than I have done, and that the lands which may lie to the south will never be explored. Thick fogs, snowstorms, intense cold, and every other thing that can render navigation dangerous, must be encountered; and these difficulties are greatly heightened by the inexpressibly horrid aspect of the country—a country doomed by Nature never once to feel the warmth of the sun's rays, but to lie buried in everlasting snow and ice. The ports which may be on the coast are, in a manner, wholly filled up with frozen snow of vast thickness; but if any should be so far open as to invite a ship into it, she would run a risk of being fixed there for ever, or of coming out in an ice island. The island and floats on the coast, the great falls from the ice-cliffs in the port, or a heavy snowstorm attended with a sharp frost, would be equally fatal." It seems strange that a bold navigator such as Cook was should venture to predict that no other adventurous spirit would attempt to outdo his achievements.

Fifty years later Weddell attained the latitude of 74 deg. S., and eighteen years after that, in 1841, Sir James Ross discovered Victoria Land in latitude 78 deg. S. But, besides these, there were many hardy navigators who added to our knowledge of the Antarctic regions. It may be a mere plagiarism to recount the following achievements, but it is necessary to do so that honour may be done to those grand old pioneers of the Antarctic wastes. In 1821, a Russian expedition under Bellinghausen and Lazaraff reached latitude 70 deg. 30 min. S., and the first Antarctic land was discovered. Bellinghausen named it Alexander Land, and his Peter I.

Island was not far distant, the former being in latitude 68 deg. 57 min. S., the latter in latitude 68 deg. 43 min. S.

Between the latitudes of 60 deg. and 70 deg. S. land has been discovered by many navigators. D'Urville discovered Adelie Land, and Powell the South Orkneys. Balleny, who sailed under the auspices of Messrs. Enderby in 1839, in the *Eliza Scott*, 154 tons, accompanied by the *Sabrina*, 54 tons, discovered the Balleny Islands and Sabrina Land, the former a group of volcanic islands. It is recorded that he saw a remarkable proof of the transport of rocks by ice. An iceberg 100 feet high was seen with a rock on its summit 12 feet in height, and weighing apparently some thousands of tons. In 1831 the Messrs. Enderby sent out vessels (the *Tula* and *Lively*) on commercial pursuits, but with instructions to their captain (Biscoe) to make whatever discoveries he could in the interests of geographical science. Biscoe attained 68 deg. 51 min. S., and there he found the same obstruction of pack-ice as Captain Cook had done. In the following year he discovered Graham Land in 66 deg. 20 min. S. In 1820 to 1824, Captain James Weddell, in the brig *Jane*, of 160 tons, sailed to the great South land to obtain seals. He reached the latitude of 74 deg. 15 min. S., and saw little ice, but a vast number of whales, seals, penguins, and petrels. Encountering a strong south wind, he was induced to return. His work is considered to be only second to that of Sir James Clark Ross, whose adventurous cruise we will now follow. His was the only expedition sent out by the British Government to the Antarctic Seas, and the object of the expedition was to make magnetic observations. He had two vessels, the *Erebus* and *Terror*, fairly well fitted to encounter the ice-laden rollers of the far Southern Ocean. In November, 1840, he left Tasmania, and in Januury, 1841, he discovered the great southern continent, which he named Victoria Land (latitude 71 deg. 14 min. S.). This land extended 450 miles, with mountains rising to 8,000 feet, and peaks reaching to 15,000 feet. Sailing to the east, he descried two islands—Possession and Franklin Islands—on which he landed. He followed this coast for 500 miles towards to the south, where, in latitude 78 deg. S. he discovered the volcanic mountains, Erebus and Terror—the

former being in full activity. The height of this mountain he calculated to be 12,000 feet. At the base of these he found a perpendicular wall of ice 200 feet in height, through which it was impossible to sail. Again we find Ross in his second voyage, beset in the pack-ice: but after numerous hairbreadth escapes he got through this pack, which apparently extended for a thousand miles, and reached the highest latitude ever attained—78 deg. 10 min. S.—without discovering any further land. In his third attempt he was too late in the season to follow Weddell's track, owing to the heavy pack-ice. Sir George Nares, in the *Challenger*, crossed the Antarctic Circle in 1874, but only remained a week amongst the bergs and pack-ice: and since that time nothing has been done in the way of Antarctic research till we come to the fleet of whaling vessels which sailed from Dundee in 1892 — the *Balæna*, *Active*, *Diana*, and *Polar Star*—on a cruise for whales and seals in the Antarctic Sea. The report of Mr. Bruce, one of the surgeons of the expedition, deals amongst other matters of interest with the temperature of the Antarctic regions. He says: "Antarctic cold has been much dreaded by some. The 429 readings I took during December, January, and February show an average temperature of only 30·76 deg. Fahr. This being in the very height of summer in latitudes corresponding to the Faröe Islands in the north, I believe the temperature of winter will not vary very much from that of summer. This uniformity of temperature partly accounts for the great accumulation of ice which is found, not on account of the great severity of the winter, but because there is practically no summer to melt it." Dr. Donald, at the conclusion of his preliminary report, says:—"An expedition composed of two ships devoted solely to scientific pursuits could do an immense amount of work here. . . . . Such an expedition could be undertaken for one season at the very small expense of £4000 for each ship. It is useless to trust to sealers for exploring purposes, for as long as they can fill the ships with blubber in lat. 64 deg. they will never penetrate to 65 deg. In September, 1894, the steam whaler *Antarctic* left Melbourne, carrying with her Mr. C. Edgeberg Borchgrevink, who wished to go to the Antarctic regions in the interests of science. Failing

to obtain a passage, he shipped as a foremast hand, but the captain and officers, knowing what his mission was, afforded him every assistance in his scientific labours. On the 19th March he read an interesting paper before the Royal Geographical Society of Australasia (Victorian Branch). On 6th November, in lat. 58 deg. 14 min., long. 162 deg. 35 min. E., an immense barrier of ice, or chain of icebergs, was met with, extending for forty to sixty miles from south-east to north-west, the highest point being over 600ft. On the 8th December the vessel was threading that pack-ice which fifty years before Sir James Ross had successfully entered with the ships *Erebus* and *Terror*. Large-finned whales, or what in Norway are called "blue whales," were seen spouting in all directions. Seals were scarce, and Mr. Borchgrevink, judging by the body scars on those that were captured, concluded that the seal in these parts had an unknown and deadly enemy. A totally new kind of seal was shot here—a species devoid of ears. The *Antarctic* on the 16th January reached Cape Adair, lat. 71 deg. 23 min., long. 169 deg. 56 min. E. Thence to the coast of Victoria Land, land could be seen stretching to the west and south, as far as the eye could reach. It rose from dark, bare rocks into peaks of perpetual ice and snow. As many as twenty glaciers were counted in close vicinity to Cape Adair. A volcanic peak was observed, comparatively free from snow, which had undoubtedly been in activity a short time ago. We next find Mr. Borchgrevink at Possession Island, on which Sir James Ross had planted the British flag fifty years before. This island, in lat. 71 deg. 56 min. S., long. 171 deg. 10 min. E., has an area of about 350 acres, and was covered with a deep layer of guano. Coulman Island was sighted on the 21st, and as the eastern end was unnamed it was then called Cape Oscar. There the compasses exhibited great irregularity. Mr. Borchgrevink considers that the island in question contains secrets of scientific value. Unfortunately the season required the vessel to return to the north, and no further discoveries were possible.

A paper on "Antarctic and Arctic Exploration," read by Mr. Clement R. Markham before the members of the Liverpool Geographical Society, 10th October, 1893, says: "The

northern region consists of an oceanic area surrounded by land, the southern region of a terrestrial area surrounded by water—a difference which leads us to expect discoveries of a different nature, and to see the necessity of different methods of exploration." In the North we have a Polar ocean, but in the South we presume a Polar continent. The reasons for this presumption are not far to seek. Sir James Ross on his second voyage, after being beset in the pack-ice for forty-six days, at last got through it, and reached the great in-barrier, bordering the continent he named Victoria Land, consisting of vast mountain ranges whose peaks attain an elevation of from 10,000ft. to 12,000ft. He followed this coast for 500 miles towards the south, when it terminated. Glaciers were observed to descend from the mountains and fill the valleys and bays of the coast, and projected several miles into the sea. It was impossible to enter any of the indentations or breaks on the coast.

Ross found that he could have landed at the foot of Mount Erebus, and could have reached the magnetic pole by a land journey, but he could find no safe harbour for the ships. Mr. M'Cormack, a member of Ross's expedition, recommended MacMurdo Bay at the foot of Mount Erebus as a place where winter quarters might be found, and says there would be no difficulty in ascending and travelling over the land. To return to the reasons for supposing that a continent and not merely a collection of mountainous islands exists within the Antarctic Circle. We learn that the ice and snow which form on the mountain slopes facing the interior of Victoria Land, descend to the lower portions of the supposed continent. There they accumulate, like the Greenland ice-foot, and attain a thickness of from 1200ft. to 1500ft. to judge by the height of the detached bergs, which usually float from 150ft. to 200ft. in height above the sea. (The average height of an iceberg above water is one-seventh of the total thickness of the berg). Now the glacier continues creeping down towards the shallow water, and eventually reaches deep water in 300 or 400 fathoms. Now begins a breaking-up process, and the huge table-topped Antarctic berg with its perpendicular sides, sails away towards the north. The size of these bergs, which during this year have been passed by vessels coming to

Australia, showing a height of 600ft. and a coast-line, if I may so call it, of from five to ten miles, is evidence that there must be an immense continental area at the Pole. If the land consisted merely of isolated peaks, there would be no continuous barrier of ice, but openings would exist and channels would be found open at some seasons by which vessels could make their way towards the desired goal. That this is not the case we have ample evidence. A continent therefore exists, and it remains for Englishmen, and especially those of Australasian birth, to explore it. Captain Larsen, of the *Jason*, landed on an island north of Snow Hill, and obtained a number of fossils, mostly of Jurassic forms (probably belemnites, crinoids, ammonites, and nautili). No traces of vegetation were found, the surface being formed of volcanic *débris* and numbers of these fossils. Dr. Donald is inclined to think that the land described by Mr. Bruce, and again by Captain Larsen, is the eastern shore of Graham's Land—that is to say, part of the mainland or continent itself.

The paper concluded with an urgent appeal for further scientific and commercial research in these regions, and with the writer's thanks to the authors of the various works which he had consulted in its preparation and upon which it had been based.

The blossoming of the Eucalyptus and its influence on the product of the Honey-bee, from a commercial standpoint.

By D. R. McConnel, M.A.

[Read at a Meeting of the Society, September 28, 1895.]

Beekeepers, like all others who are engaged in rural production, should, be, and to a great extent must be, observers of the out-of-doors manifestations of nature. To them the indications of a honey-flow are all the more important because the blossoms which yield their harvest are for the most part beyond their cultivation or control. In no part of the world has it been found profitable to combine the harvesting of honey with the growing of plants to yield the nectar. The apiarist, therefore, is thrown for his returns in some measure upon the crops of neighbouring farmers, but to a far larger extent upon the wild blossoming of field and forest. His eye is on the weeds of the byways and the meadows, or scans the treetops of the woods. To him the burden of the clouds is as momentous as to the agriculturist. A heavy, sudden storm may wash out tons of nectar from the flower-cups, long-continued wet may imprison and starve his bees, and drought may wither up the sources of his spoils. It is, therefore, no idle curiosity which leads a beekeeper to narrowly observe, and if possible make guiding deductions from, variations of the weather and of the efflorescence of honey-yielding plants.

Perhaps in no part of the world is the native flora characterised by so general and abundant a secretion of honey as in Australia, and at the same time by such capricious appearance of its blossom. The former feature is remarkable, because the honey-gathering insects are comparatively few, and the native *apidæ* are for the most part too insignificant in size to fulfil the function of floral fertilization. Probably in the case of flowering trees their fertilization is partly secured by the crowds of honey-sucking parrots and other birds which scream and chatter among the laden boughs, and completed by the honey-eating beetles, of

which there are great numbers. The uncertainty of the times of blossoming, on the other hand, is a feature more remarkable than the first, and extremely disconcerting to the apiarist. In countries of more temperate climate, furnished with a constant water supply or with more regular periods of rainfall, the honey season, if not the quantity of honey, can be depended upon with tolerable exactness. In Europe the field crops, the fruit and forest trees, the heather, have little variation in their times of blossom. In Northern America beekeepers can count upon clover, basswood forests, or mountain sage almost to a day ; and the fall brings in its regular supplement of goldenrod and other meadow and marsh plants. In Cuba and Tropical South America the honey-flow is always in the winter months. In Northern Asia and in Canada the yield is governed by the annual melting of the snow. In India it appears the migratory *Apis dorsata* is sufficiently regular in its habits for its native owners to date by. But in Australia, at any rate in Southern Queensland, it is almost an abnormality for eucalypts to blossom in successive years, or within weeks or even months of the preceding time of flowering ; while they will occasionally, though rarely, blossom twice in the same year,—*i.e.*, during the twelve months from winter to winter. Comparing season with season, it seems that most eucalypts would blossom normally every other year ; but, through an ages-long experience of our variable climate, they have developed an excessive, one might almost say prescient, sensitiveness to meteorological conditions. They are guilty of no temerarious lavishness in their arrangements for continuing their species. In wet seasons they will scarcely blossom at all, even for two or three years. In dry seasons they will blossom year after year until the next wet period. Indeed, it may be said that the hotter and drier the season the more abundantly they flower. But the very shoots of these trees seem to wait until the last moment to decide whether they shall become tufts of new leaves or branches of honey-laden blossom ; and if by any chance they have been deceived by appearances of drought into the formation of the latter, they possess the power—even after the flower-buds are apparently fully formed—of holding them month after month unopened. I have seen a grey gum (*Eu. saligna*) in my stable-

yard with flower-buds that hung for thirteen months without any apparent external change until they finally burst into blossom at the end of that long time of waiting. This was during the flood year of 1893. Incredible as it may be thought, I believe that observations of gum-tree blossoming, continued through a number of years, would give data upon which fairly reliable forecasts of coming seasons could be made. For example, the last two years, reckoned from May to May, have been an unusual period of intermittent rainfall. During that time the eucalypts have occupied themselves in extending their leaf growth; but as early as April this year almost every kind of eucalypt might have been observed to be developing extraordinary masses of flower-buds, and if the season should prove dry throughout, though not an unmixed blessing to the community in general, it will bring a wealth of harvest to the hives. Old ways are still heard of by which the weatherwise could read the skies; and old-fashioned beekeepers believed their bees knew how to forecast the coming season. There may, indeed, be more in the affinities of nature than we think; and we may, perhaps, come to understand better her infinite mysterious sympathies when we have ceased to attack her with the egotistic mathematicism of our day, and have learned to approach her through avenues of greater receptivness and love.

Besides the irregularity due to wet or dry seasons, eucalypts vary exceedingly in the normal time of flowering according to the individual kinds. *Eu. maculata* (spotted gum) flowers usually in midwinter; *tereticornis* (blue gum), about August; *crebra* (red ironbark), about September; *melano-phloia* (silver-leaved ironbark), early in December; *sidero-phloia* (grey ironbark), sometimes in December, oftener later; *corymbosa* (bloodwood), usually the latest—about March; and so on through the numerous kinds of the species. But the blossoming of individuals fluctuates much according to their distance from the coast, or position north and south. Perhaps of all the sorts in Southern Queensland, *tereticornis* (blue gum) and *corymbosa* (bloodwood) are the most constant as to the flowering time of year. It is evident then that were it not for their irregularity in blossoming eucalypts would provide an almost unequalled succession of honey-flow throughout the year. However, the

varieties do not grow so near as to provide this continuity in one locality, although so many are the different kinds that hardly any wooded district could be without something approaching it. The yield of honey from most varieties is enormous. A glorious thing it is to stand beneath a towering gum-tree almost snow-white with its profusion of blossom, its vast top "the summer home of murmuring wings." At such times a beemaster is as glad and as busy as his bees. The quantity of nectar compensates our beekeepers to some extent for the irregularity of blossoming. But it is not safe for them to depend upon eucalypts alone; and there are other trees and shrubs which give an equally good and, in some cases, a better quality of honey. They belong for the most part, like the eucalypts, to the myrtaceous order. And I cannot help regretting that in a late enumeration of the products of this order, made, as published, by a distinguished botanist of this city, mention was omitted of a product so valuable and distinctive as its yield of honey.

Among the most numerous of the *Myrtaceæ* are the "tea-trees," all of which are rich in honey—the finest quality being obtained from those that beautify the river beds and water-courses, the red bottle-brush or river myrtle (*Callistemon lanceolatus*), and others. The paper-barked tea trees (*Melaleuca leucadendron et var.*) and other swamp varieties have abundance of honey, but of a rank, objectionable flavour and smell, and dark in colour. All the *Angophora* (apple-trees and sugary gums) are good honey yielders—the so-called "sugary gum" (*Angophora lanceolata*) having a peculiarly luscious, thick, though dark honey. The *Tristania* are also most valuable honey producers, especially the "swamp mahogany" (*Tristania suaveolens*), which has a delicate honey of delicious peachy flavour and aroma, perhaps the finest to be found in the colony. The plants mentioned all flower annually, mostly in the spring and early summer, and prefer moisture to drought, with the exception of the *Angophora*, which share the irregularity of the eucalypts to which they are most nearly allied. There are, besides, great numbers of flowering shrubs and trees in scrubs, which also blossom annually, and yield honey of very fine flavours and colours. So reliable are scrub flowers for a yearly yield that no

beekeeper is wise to select a locality for his apiary where his bees cannot easily reach them. The marshes and swamps on the coast are covered with honey-plants, including a number of varieties of tea-trees and grass-trees, and the mangrove. But the honey gathered from such localities near the sea is very strong, salty, and dark, and I am particular in mentioning these facts because eucalyptus honey is often credited with flavours derived from inferior sources. The results of a harvest, and the market value of a season's take, will be much modified by the presence of honeys other than from eucalypts.

Among the eucalypts themselves the quality and quantity vary very much with the tree. The product of the blue gum (*tereticornis*) has a delightful musky perfume, very distinguishable among the hives on a warm spring evening, and a pale amber colour; but as it blossoms in late winter or early spring, the bees can seldom take full advantage of it for storing. In my experience the brightest and finest eucalyptus honey of Southern Queensland comes from the ironbarks, particularly the grey ironbark (*sidero-phloia*), and the broad-leaved or silver-leaved ironbark (*melano-phloia*), which is a stunted, crooked tree, and therefore seldom cut for timber. The bees seem to prefer the latter; I have seen them leave the grey ironbark almost untouched when both were in full blossom at the same time. The honey of the black-butt (*Eu. pilularis*) has the most unusual characteristic of not candying, even if kept for several years, probably on account of its extreme density, which gives it a jelly-like consistence and makes it difficult to be extracted from the combs.

In none of the honeys of the eucalypts, so far as I have tasted them, is there the slightest suggestion of the flavour of the oil secreted by the leaves. It is unlikely that in any of the species the oil is secreted with the honey; so that the reputed excellence of this kind of honey for medicinal purposes is probably no greater than that of any other honey, and rests on no other basis than the general emollient and nourishing properties of the article from whatever source. The much talked-of and much deprecated "Eucalyptus flavour" seems to have originated in one of those commercial tricks which do so much damage to the interests of honest traders and producers.

It will be remembered that a certain *savant* of a chemist, travelling in Tasmania some years ago, brought before the French public the "extraordinary virtues" of the eucalyptus honey he had found in that island, dark in colour, and gathered, as he stated, by black bees about half the size of the European insect. The story went the round of the newspapers, and it appears that some persons in Sydney pricked their long ears at the prospective profits of the new trade, and purchasing a quantity of so-called "blacks'" honey, gathered sometimes on the Clarence River in large quantities by natives and shipped to Sydney in casks, poured eucalyptus oil into it until they thought it had enough of the smell and flavour of that extract, and sent it off to London. About that time there appeared in the *British Bee Journal* some paragraphs on the horrible "Eucalyptus" smell of the new Australian honey, which threatened to stink visitors out of the Agricultural Show where it was exhibited. The *British Bee Journal* is, or was at that time, 1891, edited by Mr. Thos. W. Cowan, F.L.S., F.G.S., &c., &c., a distinguished scientist who had made a hobby of microscopes and bees, a member of the famous family of paper manufacturers in Edinburgh. An uncle of mine, also with a hobby for bees, was a personal friend of Mr. Cowan's, and had written to him on the prospects of a market for his Australian nephew's honey. Mr. Cowan's reply is in my possession, in which he assures my uncle that "if his nephew's honey is no better than the Australian honey he had seen and tasted, he (the nephew) would have a difficulty in disposing of it." Mr. Cowan mentioned at the same time that Australian honey fetched from 25s. to 30s. the cwt, and was bought by druggists. (It was then the time of the great influenza epidemic). The prices to-day, as reported by the London correspondent of the *Courier*, have not exceeded that figure, while he states that Cuba and Jamaica honey sells in immense quantities, and that California honey fetches 40s. and "French" 60s. per cwt. The correspondent's report in the *Courier* of August 23rd last is very interesting reading, and conclusively proves the truth of the adage about the dog and the bad name. He says he saw some lovely primrose honey from Tasmania (!) but refers to the "Eucalyptus taint" of the Australian article, and explains later on that by

this is not now understood the "true gum-leaf flavour," but is simply the "London salesman's way of expressing the somewhat heavy, pungent taste which characterises all the honey which comes from Australia." The Mincing Lane people call it "nauseous," and the agent, from whom the correspondent derived his information, refers to the particular flavour of the honey sent from Queensland as "a peculiar burnt-treacly sort of taste, as if the bees had fed upon the refuse of sugar refineries." It is evident that since the "true gum leaf flavour" is no longer there, some other stick must be found to beat our product with, and of course Queensland sugar, sugar plantations, &c., are in evidence in London. It will be enough to say that the only sugar refinery in Queensland is but a year old, and it may be safely stated that no honey is gathered for export in its neighbourhood, or within miles of it. Such are the results of disreputable mercantile doings. Anyone in the habit of using or who has tasted our best Queensland honey knows well that none of the above descriptions apply to it any way. The "burnt-treacly flavour" may have been caused by some foolish person over-heating candied honey to liquify it—a very great mistake to be guilty of. The "taint" in our honey, however choice the article we ship, will be difficult to get out of English minds; but I am satisfied that English tongues will judge our honey as we do when it reaches them. The best steps to take to eradicate this false impression and do justice to our magnificent product will be devised only by those who know the home markets. Something might be done here by proper inspection and grading, and that can be arrived at only when the usual selfishness of individual producers gives way before a desire to work for the common good of brother beekeepers. Something might be done, too, by our colonial agents and friends in England. By whatever means arrived at, the placing of Queensland honey on a home market no longer ruled by prejudice will open a most important source of wealth to beekeepers in this country, and will be an invaluable assistance to many of our settlers struggling with the first difficulties in their occupation of the land.

Narrative of Capt. G. Pennefather's Exploration of the Coen, Archer, and Batavia rivers, and of the Islands on the Western Coast of the Gulf of Carpentaria in 1880.

By Major A. J. Boyd, *Hon. Sec.*

[Read at a Meeting of the Society, November 30, 1895.]

In compiling the following paper on the above subject I have to express my indebtedness to Captain G. Pennefather, at that time commanding H.M.Q.S. *Pearl*, who was instructed to explore that (then) unknown portion of Queensland lying on the eastern shores of the Cape York Peninsula.

Although the expedition was carried out so late as the middle of 1880, even to the present day very few if any white men have been enabled to study the coast and rivers on the eastern side of the Gulf of Carpentaria with the facilities which were afforded to Captain Pennefather by the Queensland Government. His instructions were simple, and necessarily left the principal part of the work to his own judgment.

Leaving Thursday Island in the Q.G.S. *Pearl* at daylight on the 18th June, the vessel made the land at noon on the 19th in lat. 12 degs. South. The coast did not appear at all inviting, being, apparently, very barren, with long stretches of sandy beach, although further inland the country was thickly timbered. Deeming it not worth while to land on these inhospitable shores, Captain Pennefather followed the coast to the southward. When it became apparent that he had no intention of landing, a number of natives made their appearance and ran along the beach, endeavouring to keep up with the vessel. They made no demonstrations of hostility, although all were armed with spears. It may here be mentioned that Capt. Pennefather subsequently discovered that what they had taken for spears were sticks five or six feet long, having one end chewed into a sort of brush, which they used to dip into the nests or comb of the wild bees found in the hollows of trees, and which were very plentiful here. The

natives sucked the brush end after dipping it into the honey. They soon gave up the race, and he sailed on till the 20th at noon, when he came to anchor in 4½ fathoms, opposite to an estuary forming the supposed mouth of the Coen River in lat. 12 degs. 13 mins. South.

In the afternoon he started in the whaleboat to examine the entrance. It was found to be very narrow, and too shallow for the passage of anything larger than a good-sized boat. On landing the party met with numerous natives, and naturally proceeded with great caution, their object being to conciliate them as far as possible. They, however, proved to be very friendly, and were delighted with the presents made them of beads, fish-hooks, and other trifles of inestimable value to them. As the explorers went on they found that half-a-mile from the mouth the inlet opened out into a basin three-quarters of a mile wide, with a depth of three fathoms. The banks at the mouth were clothed with Casuarina trees. After trying for some time to find a deep channel, they were obliged to give up the idea of taking the vessel in, so they returned on board, and on the following day, after provisioning the whaleboat for two days, made a further examination of the mouth with a view to finding an entrance; but none presented itself of sufficient depth and width to admit of the passage of the vessel.

They therefore determined to explore the river in the boat. The shores, as they advanced, were very low, with long stretches of mangrove-covered mud flats. This feature continued for six miles, when all attempts to force a further passage were frustrated by innumerable mud-banks which stretched far into the channel and frequently barred it. There was, in fact, no appearance of a river, and the estuary proved to be merely a long inlet from the sea. Alligators were very numerous, as many as a dozen at a time being seen sunning themselves on the banks. Flocks of ducks of various kinds were seen in all directions, and those shot made an agreeable addition to the *menu*. They anchored for the first night in this inlet (in the whaleboat), and while at supper were startled by five or six alligators commencing a terrific fight among themselves close to the boat. The water was lashed into foam by the strokes of their tails; they tore each other with their claws and teeth, and

for some time a perfect pandemonium reigned, the roars of the reptiles resembling a combination of the bellowing of a scrub bull and the baying of a bloodhound. After watching the combat for a few minutes the crew realised their danger, as a blow from one of the alligator's tails would have smashed in the boat, and they would have become an easy prey. It took two or three volleys from the rifles to disperse the monsters.

At the back of the mangroves there appeared open forest, but landing was out of the question, as the soft mud extended too far from the land. As they returned to the vessel they passed several hundreds of natives at the entrance, but they made no attempt to molest the party. They had, to all appearances, never seen a white man before. There is little doubt that this is only an inlet, as there were no indications whatever of a river beyond the point to which the explorers had attained.

Finding that nothing was likely to reward further investigation, sail was made to the southward. When they were five miles from the mainland, four canoes were met full of natives. They were fine, strong, well-made men, but their canoes were very frail, consisting merely of bark sewn together, and having no outriggers. They were certainly not adapted for encountering the slightest bad weather; but all these coast natives are expert swimmers, and in the event of a capsize they would either have righted and bailed out the canoes, or could have swum ashore.

On the following day the party came-to off the mouth of the Archer River, in lat. 13 degs. 21 mins. 30 secs. South, in three fathoms of water. Between this point and the Coen River the coast appeared low, except at Pera Head and Duyphen Point, where red cliffs were to be seen. All the shores were evidently thickly inhabited, if one might judge by the numerous fires along the coast. A long shoal runs out some three or four miles from the mouth of the Archer which would not allow vessels drawing more than eight feet, or perhaps ten feet, to get in. It is, however, quite possible that a deeper channel might be found. An immense volume of water is poured down by this river, the sea being very thick and muddy for some distance out. Between the Heads there was a good clear passage, with three fathoms of water. For some three-quarters of a mile the mouth is

about 500 yards wide, when the river expands to a width of two miles. From the look of the entrance, it seemed that a passage had been found towards the interior, so preparations were made for a thorough examination of the river. It being certain that they would meet with natives, and as they did not know what attitude the latter might assume towards them, they armed a boat's crew, and Mr. Campbell, second officer, and Captain Pennefather proceeded up the river.

For the first six miles the width of two miles was maintained. A large island lay in the centre of the stream which ran in an E.S.E. direction. The main channel was found to be on the left-hand side, with a depth at low water varying from three to five fathoms; it then branches off into several creeks to the south, the main channel running east. The captain chose this course, and followed it till 5.30 p.m., when he landed on the right bank, where was found a magnificent open plain, well-grassed, extending for some miles, beyond which open forest country was visible. Game of many descriptions was abundant, especially ducks, of which they shot several varieties. As for alligators, they may be seen in all directions, either floating about or basking in the sun on the mud-banks. Several of these huge saurians were hit with rifle bullets. The number of these reptiles would make them a source of great annoyance and danger to settlers on the banks, until at least civilization and traffic should have reduced their numbers, as has been the case at Townsville, Mackay, and Rockhampton.

After having had tea on shore, they pulled four miles further up stream, and found it still running easterly, and carrying a width of between 400 and 500 yards with a depth of five fathoms. The banks were generally lined with mangroves, but in places open grassy plains came down to the water's edge, and beyond lay the open forest country.

Up to the present no natives had been seen here, but as the party went up the river they noticed numerous columns of smoke, evidently sent up as signals to give notice of their approach. As they pulled along in the dark, they passed close to one camp-fire on the river bank, and could plainly hear the natives following them up, and at one point a native sang out. Of course they could not understand what he said; probably he

wanted to know who the strangers were ; but the latter's reply was equally unintelligible to him, so that on the whole explanations were judged unsatisfactory, for the noble savage gave vent to a series of angry yells. Nothing further came of this, so they pulled on till 9 p.m., when they anchored in mid-channel.

As they were about 200 or 300 yards from the shore, and the moon was up, all thought that a watch might be dispensed with, the men being thoroughly tired out; but prudence prevailed, and one man was placed on watch.

The leader had taken the precaution to drill the men in rigging up a sort of breastwork of oars and sails round the gunwale of the boat, behind which protection the crew lay on sleeping boards stretched across the thwarts.

They had got so handy at fixing up this little fortification that it took very little time. On this particular night the gunwale cloths were stretched, and all hands but the watch lay down and were soon buried in sleep. The moon was low, and the tall trees on the banks cast a black shadow far across the water. Within that shadow a thousand canoes might have moved unseen. Having seen all instructions carried out, the captain lay down, and had slept for about two hours when the man on watch awoke him, and said he had seen canoes hovering just at the edge of the dark shadow off the shore. He lay with his eye over the edge of the breastwork and gazed intently at the shore, and was just about to tell the man he must have imagined his canoes, when he distinctly saw three canoes slip from under the shadow and begin to paddle noislessly towards the boat. Captain Pennefather gently awakened all hands, and made them lie, rifle in hand, behind the breastwork.

As they approached nearer, all but one man in the stern ceased paddling, and he noiselessly impelled the canoe towards the boat. They evidently thought that the crew were asleep and that they would fall an easy prey to them, but they reckoned without their host. As they closed, all the natives stood up with their spears poised, awaiting the moment when they could look at the whites over the gunwale.

Matters had now approached a crisis, and longer delay would probably be fatal to some, if not to all of the crew, so the

captain gave the word to fire. The enemy, completely taken by surprise, dropped into the canoes and paddled off at a prodigious rate. The party was not again molested here.

Next morning they started to pull further up the river, and the country rapidly improved as they went along. The fringe of mangroves on the banks had ceased, and rich tropical-looking shrubs had taken their place. As far as the eye could reach was magnificent open forest, the timber consisting principally of bloodwood, stringy-bark, and a few box trees. The banks were very high, and the river retained its width of 400 yards, with seven fathoms of water from bank to bank. Game was very plentiful, and there were numerous clear, fresh-water lagoons. The country was everywhere well-grassed.

They had now come some fifteen miles up the river, and as there appeared to be no change in the character of the country, it was decided to return to the vessel.

With a fair wind and tide they arrived safely in the evening, and found all well. There is no doubt that the natives here are very numerous, treacherous, and hostile, and Captain Pennefather says he should advise any white people who might find their way here, either in the interests of science or for profit, to be very careful, and go fully prepared for a constant series of treacherous attacks.

The vessel now coasted along to the northward, and at noon on the 27th June they anchored off the mouth of the Batavia River, in latitude 11 deg. 51 mins. S., longitude 144 deg. 53 mins. E. In the afternoon, the captain sent Mr. Bourne, first officer, in the whaleboat to take soundings. On his return he reported a good passage into the river, so at daylight they beat into the mouth of the river and found a good wide channel to exist, with not less than four fathoms, deepening to ten fathoms at the mouth, which is fully two miles wide. After proceeding some three miles up the river, they anchored in five fathoms. At this distance from the mouth the river or harbour was fully five miles wide.

In the course of the afternoon a landing was effected on the right bank. A great many natives were seen, who proved to be very friendly, and willingly helped the men to carry firewood to the boats. Two of them unhesitatingly came off to the vessel in

a bark canoe. Desirous of gaining their confidence, they were presented with a knife, a tomahawk, and some beads and fish-hooks, with which they were highly delighted.

Besides their bark canoes the natives construct large outrigger canoes, which are hewn out of trees and will carry a number of men. They do not appear to have had any previous communication with white people. It should be mentioned, whilst on the subject of canoes, that at Point Parker, on the western shores of the Gulf, some very curious canoes were seen, or rather catamarans or rafts of a triangular shape, built of logs of light wood lashed together firmly. The paddles were such as Captain Pennefather had never seen before. They were made out of a young mangrove tree, the loom of the paddle consisting of the straight stem itself, and the broad, flat blade being carved from the roots, which grow fan-like down into the mud. At daylight, accompanied by Mr. Campbell, Captain Pennefather proceeded up the river with an armed boat's crew. For the first six miles it maintained a width of between four and five miles, with an average depth of five fathoms. The banks on the right-hand side are very high, and several freshwater springs were met with. The country is fine undulating grassy forest, with plenty of fine timber. At six miles from the mouth the river branches to the south on the one hand, and to the south-east on the other. After some consultation it was decided to try the south or right-hand branch. This was followed for five or six miles, and the river found to be half-a-mile wide with a depth of four or five fathoms from bank to bank.

Thinking that the south-east or left-hand branch would be the main channel, they returned and went up it some distance, but, although it was very wide, they found it shallow. and as night was coming on, and as they felt certain they were in the wrong channel, they returned to the vessel. Alligators, as usual, were numerous.

Once when the vessel was anchored, whilst Capt. Pennefather went on foot inland, a kedge anchor weighing about 100lbs. was run out astern. The kedge was buoyed by an oil drum attached by a rope to the crown of the anchor. Strict instructions were given that the vessel was not to be moved.

When he returned he found to his annoyance that the vessel was turned round and was much nearer the bank. On enquiring why his order had been disobeyed, Mr. Bourne, who was in charge, assured him that an alligator had seized the buoy, and lifting the kedge from the bottom, had slued the vessel's head round and dragged her nearer the shore. This looked so much like a "snake story" that the captain had the buoy lifted, and found it so bitten by the alligator's teeth, that it looked as if it had been riddled by bullets.

Next day they started up the south branch again, and were convinced that this was the main river. Eleven miles higher up it had deepened to ten fathoms. When the tide failed, they landed and camped till it slackened. The banks on the right-hand side were high, with well-timbered, well-grassed open country, with very lofty, straight bloodwood and stringy-bark. The soil, a dark loam, seemed very fit for agriculture.

Whilst waiting for the tide, one of the men told Capt. Pennefather that an alligator was basking on a bank about half-a-mile away. Having nothing to do, he determined to stalk him, and taking with him a black boy to carry a second rifle, he set off. When about 600 yards from the camp, the boy said he "smelt bingi" (wild blacks), and scarcely had he said so, when a great number of hostile blacks showed themselves on some high ground between them and the camp. There were quite 300 of them. It was too far from camp for a "coo-ee" to be heard, and even had the captain fired his rifle as a signal, it would have served no purpose, as it would have merely been supposed that he had fired at the alligator.

The natives were all armed and evidently meant mischief. The only thing to do was to gradually edge away towards the camp. As soon as the natives saw this, they manœuvred to surround him, but before they could effect their object, he had managed to get within hailing distance. He then coo-ee'd as loudly as he could, and Mr. Campbell came towards him with some of the men. He brought the serious news that the boat was high and dry, and that the mud was so soft that the men could not get any foothold to push her off. The captain told him to go and cut a quantity of mangrove bushes and lay a track down on the mud. Meanwhile, he, himself, would try

and keep the natives in check. The latter handled their spears menacingly, but did not as yet throw any. He succeeded in inducing one or two of them to come to him and take some fish-hooks, moving at the same time quietly towards the boat. At last Mr. Campbell shouted out that all was ready. Captain Pennefather rushed down to the boat, and before the natives knew what the white men were about, the latter had run her down to the water and had pulled well into the stream. A tremendous yell and a shower of spears told of the disappointment of the savages, but the adventurous party were at a safe distance, and no one was hurt. These men were of a different type to those at the mouth of the river. They were big, tall, strapping fellows of a copper colour, and it seemed to the captain, with little knowledge of the dialects of the Gulf natives, that they spoke a different language.

They now went on their way up the river till long after dark, and anchored in mid-channel. The river here was 500 yards wide and five fathoms deep. A good watch was kept during the night, as they did not know what scheme the natives might devise for their destruction. However, they were undisturbed.

As they continued upstream next day they found the country still further improved. On both sides it consisted of beautiful open grassy plains. The banks became higher and were clothed with rich tropical scrub, amongst which was some extremely straight, lofty timber. Magnificent spars for ships could be obtained here. Specimens of the timber were cut and brought away. The soil of the scrubs is remarkably rich, and well irrigated by small streams. The water was perfectly fresh and sweet, and handsome palms grew close down to the edge.

The river now took an easterly direction for some three or four miles, becoming much wider in places, and having many small islands in the centre.

The scenery is most picturesque, the vegetation highly tropical, and the timber magnificent. At no distant date this beautiful country will probably be parcelled out in cattle stations and sugar plantations,* but the numerous and hostile natives will

* From subsequent experience of sugar country, Captain Pennefather is inclined to qualify this. The area of good soil is too limited for sugar growing, although there is a fair amount of second class soil; but the timber is magnificent, and there is any quantity of good grazing land. Cattle stations have since been formed by Mr. Nott and other gentlemen.

for a long time be a source of annoyance and danger to the pioneer settlers. Some very large catfish were taken in the river; many of them weighed as much as 30lb and were excellent eating, and were of a beautiful rosy tint (their skins). Alligators abound, but they do not appear to affect the freshwater portion of the stream. The mouth of the river would make a splendid port in which any number of vessels would lie in smooth water, whilst they could easily ascend it for 25 miles. It is much to be regretted that there was no time to trace the river to its source. From what was seen there no doubt exists much splendid country available for settlement.

Since this visit gold has been discovered at the heads or sources of both the Coen and Batavia rivers, and the advent of the "wandering digger" will doubtless be the precursor of pastoral and agricultural settlement.

Sweer's Island, Allen Island and Point Parker.

Some four months after Captain Pennefather's return from the exploration of the Batavia River, he started again to take soundings off Point Parker, which is situated on the western side of the Gulf of Carpentaria.

He first touched at Sweer's Island, after a run of seven days, in order to fill up with fresh water, which he had not been able to obtain at Thursday Island. Sweer's Island is only five miles long by one broad, lightly timbered, and the soil is of a loose sandy nature. How it carried the large number of cattle, sheep and goats seen then was a marvel. These numbered some 1200, and they appeared to be in very fair condition. Very few buildings were standing, and they were rapidly crumbling through the ravages of the white ants. The ruins even of the old and once-thriving township of Carnarvon were swept away, and all that remained to tell that the white man once lived here were heaps of broken bottles and old preserved provision tins.

On an old tree the date 1802 was still clearly defined, marking the year of the visit of H.M.S. *Investigator*, and another much earlier date is supposed to have been carved by the Dutch. The climate and soil appeared to be eminently adapted for

tropical fruit culture. The guavas, dates, tamarinds, etc., planted by the early settlers were thriving well. There are also two cocoanut trees which bear good fruit.

Investigator Road, as the harbour is named, is well sheltered and deep enough to admit of the approach of the largest vessels within a quarter of a mile of the shore. Captain Pennefather took an opportunity of visiting Bentinck Island, which is about ten miles long by five or six wide. This island is fairly grassed and timbered with stunted Moreton Bay ash, bloodwood and fig trees. On the south side of the island there is a fresh-water lake. The natives seemed to be numerous. A large mob of them were seen, but they would not allow the party to approach them. On a small island (Fowler Island), lying between Bentinck and Sweer's islands, some tamarind trees were seen which were supposed to have been planted by the early Dutch navigators, bearing heavily and exhibiting a luxurious growth.

Having filled up with fuel and water, the party sailed on the morning of the 20th October, and next day anchored off the S.E. end of Allan Island. Sounding was at once commenced, and soon some hundreds of soundings were marked on the chart.

As to its physical features, Allan Island presents a surface of a gravelly ironstone, with a pipe-clay foundation. The north-west portion of the island resembles Sweer's Island to a certain extent, and the soil and grass are superior to that of the south end. Water is easily obtained by sinking, as was found by the discovery of several native wells. The island is of small dimensions, being only four and a-half miles long by about one mile in width. They now took soundings, and laid down the positions of various points, until they anchored one mile from Point Parker in 4½ fathoms, a remarkable group of trees (*Seaforthia elegans*), to the southward of the Point, bearing South 18 deg. West. In the afternoon they landed on Point Parker. The landing is not a particularly good one, as it is fringed by rocks and stones for a quarter of a mile from the beach. A ledge of rocks running out towards the north-west could be transformed, by a little engineering skill, into a good natural breakwater.

One of the first things that struck them on landing was the magnitude of the native fish-traps. These are precisely of the same description as those of the natives of the islands of Torres Straits. They formed, in reality, a succession of walled-in paddocks of many acres in extent. At high tide the fish come in, and as the tide recedes they are left high and dry.

The soil at Point Parker is of a loose sandy nature, except in beds of watercourses, or rather of what would be watercourses in the wet season. In these the soil is black and apparently fertile.

The timber is of the usual Australian type, consisting mainly of Moreton Bay ash, fig-tree, stunted bloodwood and pandanus. There is also a beautiful shady tree which had not before been seen. As on Allan Island, fresh water is plentiful, but shallow; wells had to be sunk to obtain it. There was no semblance of any creek or river in the vicinity. The characteristic features of the country are undulating plains, diversified by belts of timber. There are several swamps, but these were dry at the time of this visit. Proceeding inland, the country became more elevated, and it did not present any evidence of being subject to floods. It lies much higher than the country subsequently seen between Normanton and Kimberley, on the Norman River. Game was very plentiful. They saw great numbers of emus, wallabies, turkeys, and ducks. Pigeons were also very numerous. Of the natives none were seen, but to judge by their deserted camps and the tracks left by them, they must have been about this district in force. Tracks of horses were observed both coming and going. It was unfortunate that they had no horses, as after penetrating inland for eight or ten miles they were unable to proceed owing to an injury to the captain's foot.

The coast to the S.E. of Point Parker is clear of mangroves, the sandy ridges coming right down to the beach, and the first timber met with consists of casuarina trees, but the country improves towards the direction of Burketown. The only wind which could affect a vessel here is one from the S.E., which blows off the land; but the shoals extending from the coast tend to break the force of the sea. To the northward and westward the anchorage is sheltered by a line of sandbanks and shoals extending from the N.W. point of Allen Island towards Bayley Island.

Whilst sounding in the whaleboat to see if it was practicable to take the vessel to Bayley Point, 10½ miles N.W. from Point Parker, the boat ran up a creek about four miles distant. Having landed they walked inland for about four miles, when on surmounting a ridge they saw what appeared to be a beautiful limpid lake about a mile in diameter. A sandy beach appeared to run round it, and the trees were beautifully reflected in the water. The men, hot and thirsty after the long pull, followed by the march inland, ran ahead to bathe and quench their thirst, but they were surprised and disappointed to find that the further they ran the more it receded, and then discovered that what had been taken for a fine sheet of water was but the result of a most exquisite mirage on a large saltpan which seemed to stretch out nearly to Bayley Point. Captain Pennefather named the creek Saltpan Creek, and all returned to the boat sadder but wiser men. They then followed an intricate but practicable channel varying in depth from 1½ to 11 fathoms, and landed on Bayley Point. The landing is easy on a sandy beach. Bayley Island was found to be fairly grassed, about two miles long and one mile wide. On the north side there is a native well and a camp. As soon as the party came in sight the natives bolted into the bush. Looking from the top of the coast ridge several native camps could be seen, but as usual the occupants ran off at the approach of the whites. The timber here consists of bloodwood, Moreton Bay ash, fig-trees, &c. Beyond the ridge nothing was visible but low saltpan country, intersected by a salt creek running in a W. by N. direction. To the westward of this point the coast, as far as could be seen, appeared low, with mangrove-covered mud-flats extending a considerable distance out to sea. The anchorage is excellent in all winds between Bayley Island and the Point. Although the sun was hot in the daytime, yet at night a double blanket was very acceptable, not only on account of the cold but to protect the body from the drenching dews. Having satisfied himself that it would be feasible to bring the vessel here, the captain returned on board. Fish are very plentiful, and several large hauls were made with the seine. Finding that there was no possibility of taking the vessel further to the west than Bayley Point, they returned to Point Parker. In this neighbourhood the tide rises

twelve feet at springs—at least it was so while the vessel lay there—but to judge from tide-marks seen, at certain seasons of the year it must rise considerably higher. There is only one tide in twenty-four hours, though there were two fathoms in the channel leading into the anchorages at Point Parker at spring tides. As the rise and fall of the tide are affected in this part of the world by the winds and seasons, it is possible that there might be at times a foot or two less water than was found to be the case. Leaving Point Parker Captain Pennefather decided to return to Thursday Island as it was too late in the season to attempt the survey of waters in the vicinity—a work which would occupy at least three or four months.

It has already been mentioned that the natives here have no canoes but V-shaped rafts of light logs.

A very fine tree was met with during one of these expeditions, called by the natives "Wonghi,"* which grows about the N.E. channel towards Murray and Darnley islands. It has a glossy leaf much like that of the camellia. The bark is grey and rough like that of the cedar tree. When polished the timber is very handsome. It grows to a height of about thirty feet, and bears a fruit something in appearance and taste like a date. The natives dry it much in the same fashion that dates are dried. About the month of November, the Torres Straits pigeons come in thousands to feed on it. The trees are infested with a description of python, which reaches a length of twenty feet. They coil themselves in the forks of the trees and feed on the pigeons, which easily fall a prey to them. They are perfectly harmless, and much resemble the carpet snake of the mainland. The natives, however, have a dread of them, and believe them to be venomous. Captain Pennefather caught six in a very short time. One of these bit him, a circumstance which filled the natives with terror. They had been on the point of leaving, but now they said they would wait and see the captain die. "Bimeby, when sun go down, you die," they said, and squatted down to await the catastrophe which was to come off at sunset. Nothing, however, happened, and next morning he felt nothing the worse for the bite. But the natives were not at all satisfied about

* This tree is a native of Torres Straits, or rather of all the islands in the vicinity of Torres Straits.

the result; they had made up their minds to give him a good "wake," and were quite prepared for it, and did not like the disappointment, and even afterwards looked upon him as something uncanny.

There is a fish in these waters, mentioned by Wallace in his *Malay Archipelago* the "Remora,"* a large sucker-fish which grows to a size of about 2ft. 6in. to 3ft. It has a head fluted on top, with great adhesive powers, and is caught and trained by the natives to catch turtle.

The natives catch these Remoræ with blunt hooks, and keep them tethered alongside their canoes with a stout line of about the size of a schnapper line attached to them and coiled down conveniently in the canoe. When they see a turtle basking on the surface, they approach it as quietly as possible, and when within throwing distance, they take Mr. Remora in their right hand and the coiled line in their left and heave him as far as they can towards the turtle. The sucking-fish immediately goes for the latter and attaches himself, and then it is a case of "Pull devil, pull baker," but the turtle has to come. The natives haul on the line and the turtle is rolled into the canoe. The Remora is detached by a side jerk, and is patted on the back and is given a few choice morsels of "ki-ki" (food), and swims gaily alongside again, quite proud of his performance. When tired of swimming he attaches himself to the bottom of the canoe, and allows himself to be carried along until again required—"*Mens conscia recti.*" These fish are of different colours—some dark brown, some black and yellow, some mottled, &c. Whilst cruising in the *Pearl*, a number attached themselves to the vessel, and when at anchor in a smooth place, they could be seen swimming about on the lookout for the pickings thrown overboard by the cook from the galley. The ship would get underweigh, and on arrival at the next anchorage, perhaps a hundred or two hundred miles away, the Remoræ would detach themselves from the copper and swim gaily round with a weather eye on the galley. The crew knew them individually, and christened them "Billy," "Jack," and so on, and Capt. Pennefather says he "believes the fish distinguished the different members of his crew."

* Also caught in Moreton Bay.—A. J. B.

Such is the record of the first explorations of the rivers which even now, are unvisited and uncivilized, except by the diggers and by the missionaries on the Batavia River (*vide* notes on cattle stations). Doubtless, ere many years have elapsed, thriving homesteads, sugar plantations, and grazing farms will be established here; but for some time the blacks, who are exceedingly numerous, must be reckoned a source of great danger and annoyance to the settler.

“The Alleged Leakage of Artesian Water.” *

In an interesting letter to the Brisbane *Courier* of December 27, 1895, our member, Mr. W. G. Cox, C.E., discusses the subject of “The Alleged Leakage of Artesian Water.” The letter is a lengthy one, and besides giving expression to Mr. Cox's own views it professes to review the opinions of others upon this important, but, as yet, imperfectly understood subject. Mr. Cox is particularly explicit in stating that his views are expressed from the standpoint of “a civil engineer,” and in that case his opinions deserve to be treated with respect. It is not because he differs from my own views upon the subject, nor is it with the object of challenging his opinions that I now invite the attention of our Society to the letter in question, but it is rather with the intention of giving our members an opportunity of discussing the subject, so that by this means new points of interest may probably be brought forward. It is first to be noticed that Mr. Cox has drifted into the somewhat inconclusive, though by no means uncommon, method of referring to the opinions of others and at the same time overlooking the reasons upon which the opinions are based. By the same method of procedure quotations are freely given and the full context of the subject withheld. This is not only misleading but manifestly unfair, as will be shown later on. It is like taking up a book, snatching a few paragraphs or sentences from it and then reviewing it without reading the preface and text.

The *Courier* review of the Annual Report issued by the Chief of the Water Supply Department appears to have inspired Mr. Cox with the idea of writing the letter. As an Hydraulic Engineer of very long and wide experience in this and other parts of Australia one would naturally think that Mr. J. B. Henderson is eminently qualified to deal with the subject of artesian water supply, and the brief remarks which occur in his annual report for 1895, to the effect that he is not aware of

* Abstract from an Address delivered to the Members of the Royal Geographical Society of Australasia (Queensland) by the President, Mr. J. P. Thomson, F.R.S.G.S., etc., at a special meeting, January 17, 1896.

any evidence of extensive underground leakage, are simply statements of fact.

In Mr. Cox's communication to the *Courier* reference is made to the opinions expressed by our esteemed Government Geologist, Mr. R. L. Jack, in favour of the leakage of artesian water into the sea. I may here remark parenthetically that the allusion to the subject of the alleged leakage of artesian water in my recent Presidential Address was suggested by a hurried perusal of a recent publication entitled *Australian Physiography*, by Charles H. Barton, M.A., of the Maryborough Grammar School. On page 38 of this manual it is stated that "an account of the distribution of the inland drainage would be incomplete without some mention of the copious floods of fresh water that find their way into the sea underground between Cape Otway on the south coast, and the Murray mouth. There is no known means of measuring the volume of water thus surreptitiously, so to speak, abstracted from the land that so greatly needs it; but it is believed to be no less than is poured into the sea by the Murray through Lake Alexandria." Now, this oracular statement is made without any adequate means of showing upon what grounds the author has based his conclusions, and if you refer to my own Presidential Address, where I speak of the coast between Cape Otway and the Murray, you will see at once that it is to Mr. Barton's views I refer and not to those expressed by anyone else.

The following extracts from Mr. R. L. Jack's paper on "Artesian Water in the Western Interior of Queensland *" (*which Mr. Cox has not quoted*), will be of interest. Mr. Jack says:—"Two kinds of leakage might affect the bibulous beds at the base of the Lower Cretaceous formation in a sufficient degree to be worth consideration for the present purpose. Suppose the beds to dip seaward and beneath the sea, and either to rise to the ocean bed or to dip at a lower angle than the slope of the sea bed, there would be a leakage into the sea. And again, suppose (what we believe to be actually the case), the outcrop of the beds to occur at gradually lower levels till it attains the sea level, there would be a leakage in the form of springs or into river beds all

* "Artesian Water in the Western Interior of Queensland," by R. L. Jack, F.G.S., etc., Bulletin No. 1 of the Geological Society of Queensland, p. 9.

along the line. . . . . Some evidence has been adduced to prove that leakage of the first kind actually takes place." Here Mr. Jack refers to the springs of fresh water at Port Macdonnell, rising up from the floor of the ocean at some little distance from the sea shore, and to others along the south coast of Australia, between Warrnambool and the Murray mouth, where the sea literally bubbles up with fresh water which has leaked up through the sea sands, as reported by Professor David, Messrs. Griffith and Pittman. "But," continues Mr. Jack, "if Lower Tertiary rocks form the cliffs, the fact that the water leaks from them above the sea level, has no direct bearing on the question of an outlet for the Lower Cretaceous strata. The Tertiary cliffs may, for any evidence there is to the contrary, extend beneath the sea and leak out there sufficiently to account for the phenomena referred to by the observers quoted. I cannot deny that the Lower Cretaceous formation may crop out at the sea bottom, still further out to sea, but the fact is not proven, and in the nature of things it is not likely to be proven. Nor is evidence of the second kind of leakage to hand."

I am, however, of opinion that the evidence in support of the second kind of leakage, in the form of springs, is stronger than that in favour of the first. As far back as 1863 the late Rev. J. E. Tenison-Woods drew attention to the favourable conditions of the central basin of Australia for the formation of artesian wells, and in an able article written for the *Australian Handbook*, that well-known authority states, on page 119 of the 1895 edition, that "In the central depression of the continent and in North Australia there is a line of groups of thermal and cold springs covering several hundred square miles. These send forth water from great depths, and are, no doubt, derived from a central underground reservoir whose sources are on the slopes of the tableland. That the waters come from great depths is seen from the fact of the temperature and the mounds of sinter or travertine around them." Here we have *primâ facie* evidence of the leakage of true artesian water in the interior of the continent; whereas, on the other hand, there is no direct evidence whatever to show that "the springs of fresh water rising up from the floor of the ocean" (to which Professor David, Messrs. Griffith, Cox, and others have alluded) emanate

from an artesian source at all. In fine, my own observations of similar phenomena, in Australia and elsewhere, lead me to believe that the leakage issues from the Tertiary strata and is in no way connected with the true artesian water supply of the interior of the continent.

As remarked elsewhere, the subject of the alleged leakage of artesian water is one about which there is really little definitely known outside the limits of mere conjecture, but the theme is, nevertheless, of sufficient importance in itself to open up an interesting field for the expression of speculative views, until extended observations furnish students with more reliable data than it is possible at the present time to obtain. Theories are, no doubt, satisfactory enough to the mind that conceives them, and we should be enabled to occupy a very perfect and beautiful sphere of life were it possible to realise the many marvellous speculations of prolific imagination. To those who hold fast to the view of the leakage of artesian waters into the sea, many apparent contributing causes have suggested themselves. The alleged rapid disappearance of flood-waters in the channels of watercourses has been accepted as evidence in support of the opinion that a very large percentage of rainfall finds its way into the water-bearing beds of the Lower Cretaceous formation, and it has been stated that the capacity of these beds would be inadequate to contain the amount of water annually absorbed if no subterranean leakage existed. Upon this hypothesis, it has been asked, with some reason too, "Where does all the water that has accumulated in these natural underground reservoirs for ages go to, if there is no leakage into the sea?" The quantity of water drawn off by the artesian wells is nothing in comparison to that annually absorbed by the bibulous rocks of the water-bearing beds. Where then does the surplus water go to if no subterranean channels communicate with the sea? In the first instance, it is well to point out that the alleged rapid disappearance of river flood waters over certain areas need not necessarily have any direct bearing upon the subject at all. Even supposing that, in the nature of things, there is something more than an imaginary disappearance, there is no conclusive evidence to show that the waters so absorbed are conveyed to the Lower Cretaceous beds. It is no uncommon occurrence for river-

waters to entirely or partially disappear in some of the sections of a river channel, and to again reappear in other places, after having circulated along the lower levels of subterranean arteries, sometimes for very long distances. A striking example in this connection has recently been made public by M. Martel, in his profusely illustrated volume entitled "Les Abîmes." In this work the author describes his elaborate investigations of the subterranean watercourses of France, and shows that many of the rivers disappear from the surface channels and continue their courses over lower levels along numerous subterranean cavities. Of these 230 were explored between the years 1888 and 1893, 165 of them being examined for the first time. Some of these were explored at a depth of 190 metres from the surface, and at the bottom of the *abîme* of Deves de Reynaud, near St. Remeze, the bones of mammoths and all the quaternary fauna were found at a depth of 52 metres.

It must be borne in mind that in the case of our own inland rivers there has been no systematic gauging of them. Their capacities are as yet unknown and the quantity of water discharged in proportion to the rainfall is a problem awaiting solution, and in the nature of things is not likely to be accurately known for many years to come. It is only by the proper gauging of rivers and a detailed examination of their channels that we are enabled to estimate with any degree of certainty what proportion the quantity of water discharged by them bears to the rainfall over the catchment areas. Until we have done so, and have investigated the meteorological conditions of the country, I maintain that no connection whatever can be established between the alleged rapid diminution of the flood-waters of our inland rivers and the artesian water supply of the interior. In fact, at this stage any attempt to establish such a connection must necessarily be founded upon a purely conjectural basis. In connection with this subject much has been said about the quantity of water discharged by the Darling River. In a paper contributed to the Journal of the Royal Society of New South Wales, in 1889, on "The Source of the Underground Water in the Western District," Mr. H. C. Russell furnishes some interesting figures in support of his opinion that there must be an enormous

underground water supply in the Darling basin of "at least equal to sixteen times as much water as passes Bourke now." Mr. Russell says:—"The mean rainfall on the Darling River catchment for the past ten years has been 22·14 inches, and of this only $1\frac{1}{2}$ per cent., or 0·33 inches of rain, passes Bourke in the river." As these figures have been quoted and referred to without any doubt, by other writers upon the subject of the artesian water supply, I have taken some trouble to test them, and it will probably be interesting to point out that the results of my own investigation differ very widely from those just cited. In point of fact the total effective catchment area of the Darling River above Bourke is equal to 74,760 square miles, and the mean annual rainfall about 20 inches. At Bourke the mean discharge of the river is equal to 6557 cubic feet per second, or say, *six* per cent. of the rainfall. These figures have been obtained from the Annual Report of the Chief Engineer for Water Conservation, New South Wales, Sydney, 1891, and of their accuracy there is little doubt. The earlier gauging of the river was defective, and the contributing catchment area, upon which Mr. Russell's calculations were based, too great. It is doubtless to both of these causes that we must attribute the error.

When it is taken into consideration that the climate of the Bourke district is one of the hottest and driest in the country, it will not I presume be difficult to imagine that an enormous volume of the somewhat scanty rainfall must be lost by evaporation as compared with the rather small quantity discharged by the river.

Where does the accumulated surplus artesian water go to, it is again asked, if no leakage into the sea occurs? It is in nature we ought to seek for an answer. If a large sponge be filled with water and exposed to the influence of a dry atmosphere, the whole contents of it will disappear by the process of evaporation. Extend the same experiment to a porous rock of any size, a piece of timber, or any other substance whatever capable of absorbing water, and similar results may be obtained. The time occupied in evaporating a given quantity of absorbed water will, of course, depend upon the size and density of the absorbing agent. In green timber sap is always present in more or less quantity, but it will all disappear during the process of seasoning. In the case of our rocks and soils there is rapid evaporation under

favourable atmospheric conditions, owing to high temperature produced by *internal* as well as external heat.

It has been stated that "the evaporation of the rainfall . . . is comparatively a mere bagatelle," but at the same time no attempt has been made to supply an estimate of the quantity evaporated. I shall, however, endeavour to supply the necessary information and to show that in some parts of Australia the percentage of the rainfall lost annually by evaporation is very great indeed—it is, in fact, astonishingly great to those who have but a very vague idea of the intense heat and dryness of the Central continental atmosphere. I shall at first give the lowest reliable figures. At the Enoggera Reservoir, near Brisbane, the water evaporates at the rate of $\frac{1}{4}$ inch per day, and in the Central regions of Australia it has been estimated, by a series of experiments and reliable observations elsewhere, that the process of evaporation goes on under favourable conditions at the rate of *one inch* per day. This latter, it should be borne in mind, is a very low estimate indeed, for evidence is not wanting to show that at times it is far greater. But I have purposely given the lowest, and it will, no doubt, be sufficiently striking to convey to the ordinary mind some idea of the enormous loss of the somewhat scanty rainfall of the inland regions of Australia by evaporation alone. Just imagine what this means in regions where the annual rainfall is not greater than from 10 to 12 inches. It must be remembered too that it does not fall as ordinary rains do in well watered country, but is mostly precipitated in a series of very irregular and spasmodic thunder-showers, when simultaneous sunshine and rain are not uncommon.

One or two remarkable examples of the atmospheric condition of Central Australia will tend to further emphasize my remarks upon this subject. In one of his exploring expeditions, my esteemed colleague and predecessor in office, the Hon. A. C. Gregory, had several hard gutta-percha drinking mugs with him. These were left in camp one day on top of the table. When the explorers returned in the evening the mugs had disappeared, the only trace of them remaining being a liquid glutinous substance on the spot where the mugs had been left. On another occasion Mr. Gregory was camped about a quarter of a mile from a creek, and it was necessary to swim it when

returning to camp on one occasion. Mr. Gregory wore a thick pair of heavy moleskin trousers, and, in swimming the creek with them on they were, of course, completely saturated, but, after walking into camp, the whole of the water absorbed had evaporated absolutely, and the trousers were quite dry. The experiences of all the pioneers of Australian exploration and early enterprise in the march of empire furnish abundant evidence, often sad enough in its details, of the excessive heat and intense dryness of the interior regions of our continent. There are long periods during which the temperature of the soil is abnormally high and the dryness of the atmosphere beyond anything known in temperate zones. As a further interesting example of this, it may be instructive to quote an extract from Dr. Alfred Russell Wallace's recently published work on the geography of Australia:—"In the desert interior these hot winds nearer to their source are still more severe. On one occasion Captain Sturt hung a thermometer on a tree shaded both from the sun and wind. It was graduated to 127 deg. Fahr., yet the mercury rose till it burst the tube! The heat of the air must, therefore, have been at least 128 deg.—probably the highest temperature recorded in any part of the world, and one which, if long continued, would certainly destroy life. The constant heat and drought for months together in the interior are often excessive. For three months Captain Sturt found the mean temperature to be over 101 deg. Fahr. in the shade; and the drought during this period was such that every screw came out of the boxes, the horn handles of instruments and combs split up into fine laminæ, the lead dropped out of pencils, the hair of men and the wool of the sheep ceased to grow—and the finger nails of the explorers became brittle as glass."* Numerous additional examples could be cited in support of these experiences, but enough has already been said to convey to the ordinary mind some idea of the intense heat and dryness of the atmosphere of the Central regions of Australia and the enormous quantity of water that must in consequence be annually abstracted from the soil by evaporation. But no stronger proof is needed than the numerous striking monuments that occupy large middle areas of the country. These stand out

* Stanford's Compendium of Geography and Travel, Australasia, vol. i., by A. R. Wallace, LL.D., D.C.L., etc., p. 35.

in bold weird relief on the face of our maps in the form of extensive salt lakes, saltbush, and saltpans, as they are locally designated, indelibly stereotyped traces of the influence of evaporation. All the so-called lakes of Central Australia are salt, and these, with the immense deposits of salt and soda there, bear silent testimony to the great quantity of water drawn from the thirsty ground by a dry hungry atmosphere. If we wish to go outside of our own country for further information upon this subject we have a typical example in the drying up of the Dead Sea. There may be found a vast natural reservoir whose water has been reduced by evaporation to considerably over a thousand feet below sea level, and this in addition to the loss of the waters of the river Jordan, and other streams that are continually poured into it.

I am not going so far as to say that there is absolutely no leakage of artesian water into the sea—in favourable localities where water-bearing beds exist in coastal regions there may be an oozing out of water through the porous strata along shallow shore beds—but I am certainly of opinion, and the more I study the subject the more firmly convinced I feel, that it is comparatively insignificant and does not extend to nor affect the great inland water-bearing beds of the Lower Cretaceous formation with which it is probably in no way connected. As formerly remarked in my Presidential Address to this Society, the physical structure of the continent is such as to prevent an extensive leakage into the sea. Except at the head of the Great Australian Bight, where the limestone outcrops are met with, and on the southern shores of the Gulf of Carpentaria, the whole outer rim of the great Central basin consists of the older Palæozoic rocks, and it is scarcely possible that the necessary conditions for an extensive subterranean leakage can exist in these. A careful study of the configuration of the continental mass and its internal physical structure as a whole will, I believe, be sufficient in itself to support this view. The basin of the Darling is almost wholly circumscribed by the Palæozoic rocks of the Great Dividing Range that bound it on the north, east and south, constituting an impregnable barrier against any possible leakage into the ocean ; while there exists on the western flank a couple of remarkably well-defined masses, known as the Flinders and Gray ranges. These are only barely separated in the interior by a gap, chiefly occupied by

isolated hills and small ranges, with intervening areas of low swampy country, associated with the interior lake regions of the continent—the structure of the low-lying portions probably representing an age closely corresponding to that of the Tertiary or Post-Tertiary. The whole Central basin is nowhere greatly elevated above sea level—some of the lakes themselves being actually below it—and it is difficult to conceive how any considerable leakage of the artesian water supply can occur in a region so dissimilar in physical structure to that of any other part of the continent or to any other country. It must be remembered that here the levels are so low that it would be difficult, if not altogether impossible, for water to circulate along them by gravitation. Against this opinion it may be contended that the Lower Cretaceous water-bearing beds have not yet been traced to the Central region in question, but there are, to my mind, many favourable indications of their wide extension and a more widely extended examination will very probably show that they stretch right across it. In further support of the theory of leakage, it has been stated that the capacity of the water-bearing beds can only be rendered efficient and adequate by the subterranean channels that communicate with the sea. That, in fact, the quantity of water drained off by these compensating or accommodating arteries is about equal to that absorbed by the bibulous rocks, and upon this hypothesis we must conceive that there is an absolutely inexhaustible underground reservoir of artesian water, with an outflow so nicely regulated that its capacity is *in equilibrio*, and adequate to receive and contain the whole volume of water greedily absorbed during periods of rainfall and flood, and that, moreover, the waters of this reservoir never reach sea level even during times of prolonged drought, as evidenced by the constant and undiminished overflow of our artesian wells. Were cause and effect thus so easily explained, we should have before us one of the most remarkable examples of natural phenomenon with which students of the century have had to deal—one of the most interesting dynamical problems of the age. It would, indeed, be a remarkable natural process by which an artesian reservoir could be so regulated and controlled that its waters would never fall to the level of the sea even during long periods of intense dryness, when there could be no local supply with which

to replenish an ever-decreasing store. In this connection it must be borne in mind that the erosive action of the water would be likely to constantly *increase* the leakage rather than to diminish it, and for this reason alone it is difficult to see how the loss could be regulated. The tendency of all water leakages, where an internal pressure exists, is to *increase*, and the increase will not be diminished while the pressure continues. A necessary condition favourable to the leakage of artesian water is the outcrop of the base beds beneath the sea. That such may actually occur in Torres Straits or at the head of the Great Australian Bight, where the Palæozoic rim of the great Central basin has probably been fractured and now occupied by the bed of the inland sea that once swept across Central Australia from north to south,—that such may actually occur only in the case of the water-bearing beds bordering upon the coastal regions I am not inclined to dispute, but it is more within the category of possibilities than of probabilities, and I am strongly of opinion that the pressure of the higher specific gravity waters of the ocean would prevent any remarkable leakage at anything like considerable depths.

I wish it to be understood that the foregoing remarks were made by me with the object of initiating a discussion upon the subject of "The Alleged Leakage of Artesian Water," and I regret that the writer of the letter to the *Brisbane Courier* of December 27, 1895, was not present to take part in it.—J.P.T.

NOTE.—Since the delivery of the preceding discourse, a paper has been read before the Royal Society of Queensland by Mr. A. Gibb-Maitland, C.E., F.G.S., on "The Geological Structure of Extra-Australian Artesian Basins." I have not had an opportunity of perusing the paper, but from the *Courier* report it appears that Mr. Maitland holds to the view that almost all artesian basins leak out into the sea, and he has, it is said, undertaken the somewhat gigantic study—a study that can never be conclusive and satisfactory without wide knowledge of locality and climate and physics—of the structure of artesian basins in other parts of the world, in support of the theory that similar conditions obtain in Australia. Against this view, I simply wish to state that no parallel exists between the physical structure of Australia and other countries, and that dominating local conditions are unfavourable to the successful treatment of the subject from Mr. Maitland's standpoint.—J.P.T.

The following copy of a letter from the Hon. A. C. Gregory, C.M.G., etc., President of the Australasian Association for the Advancement of Science—who probably more than any other living authority has had the best opportunities of studying the physical and geological structure of Australia—will no doubt be of interest:—

J. P. Thomson, Esq.

Dear Sir,—I have read the proof of your paper on the "Alleged Leakage of Artesian Water." and think that you have dealt with the question on its true merits, though from the restricted space available in the paper there is still a large amount of evidence not mentioned which would strongly support your views on the subject.

My own idea is that the flow of the artesian water of the interior is towards the great salt lakes or marshes in South Australia, where the strata, being thinner, admit of a slow waste to the surface where the evaporation is ample for its dissipation without going any further, and the country has such a small elevation above the sea that the hydraulic gradient would not be enough to give any appreciable current, even if there were a permeable strata.

That the evaporation of the surface waters is quite equal to the rainfall in the Central regions of Australia is proven by the fact that there is no overflow to Spencer's Gulf.

Yours truly,

(*Signed*) A. C. GREGORY.

21/4/96.

DISCUSSION.

At the following ordinary monthly meeting of the Society, held on Friday, April 24th, 1896, the Hon. A. C. Gregory, C.M.G., etc., was afforded an opportunity of expressing his views upon the subject of the preceding address, on "The Alleged Leakage of Artesian Water."

Having pointed out on a diagram map—which he had specially prepared —the relative positions of the watershed areas of Australia, Mr. Gregory said:—

"The basins of depression that occupy the interior of the Australian Continent, are surrounded by ranges of mountains, varying from one thousand to five thousand feet in elevation on the north-east and south, and on the west by the plateaus on which the Western Australian gold mines are situated, the latter having an elevation of over one thousand feet, leaving only small spaces at the mouth of the Murray River and the head of Spencer's Gulf through which it would be possible for the waters of the interior to pass to the ocean, as the high lands by which these basins are otherwise surrounded consist of the older rocks which are impervious to water.

"Now these immense basins are geologically formed presumably of granitic, palæozoic, and mesozoic rocks, which are impervious to water.

"The degradation of these older rocks during the Cretaceous period resulted in the deposition of extensive beds of sands and gravel. These were succeeded by finer grained material, forming stiff clays and shales, which covered the central parts, but left the higher margin of the more pervious beds exposed.

"The rainfall on these higher portions being absorbed, flows into the gravel beds beneath the clays, and when these superimposed beds are penetrated at lower levels by bores, the result is the flow of artesian water.

"In the catch-water basin of the Murray, Darling, and their tributaries, the water collected in their channels near the eastern Dividing Ranges is greatly decreased by evaporation, and there is no compensating accession from springs in their lower courses.

"In the basin of the Barcoo, Thompson, Diamantina, and other water-courses the flow is towards Spencer's Gulf—though there is reason to suppose that in past ages they flowed to the sea; the decrease in rainfall has resulted in the total evaporation of all surface flow in the salt marshes known as Lakes Torrens, Eyre and Amadeus.

"The problem which has been suggested is—Whether the rain which falls on the margins of the pervious strata, and flows under the Central clay plains, passes on to the ocean by some subterranean channel, or is disposed of in some other manner.

"The elevation and impervious character of the older rocks which so nearly surround the basins, preclude any outflow by gravitation, except at the mouth of the Murray River and Spencer's Gulf; but in neither case is there any indication of any subterraneous outflow, while the geological structure ot these localities, and the extremely low level for many miles inland, are strongly adverse to its existence. On further investigation we find that the lower parts of the basins show a thinning of the clay beds and exposure of lower strata of more arenaceous character, through which the water might slowly percolate to the surface, and that in some instances it forms small springs of a character which might be termed artesian, while in the greater part it has assisted in the formation of the enormous areas of salt marsh which occupy so much of the central depression of the Australian interior, the immense quantity of salt and soda being the result of the long-continued evaporation contingent on the arid climate.

"Thus, we may reasonably assume that there is an exceedingly slow movement of artesian water from its elevated intake to the lower region of the salt marshes, which has been sufficient to prevent its becoming so much impregnated with mineral salts as not to be potable.

"Another question of great importance is—Whether the supply of artesian water is liable to be exhausted by the bores which have been, or are likely to be, made for the supply of water.

"A rainfall of eighteen inches on one acre of land is equivalent to 1000 gallons of water per diem, and as the annual rainfall is at least three times this amount, and it be assumed that only one-third part passes to the artesian supply, one thousand acres of catchment area would be sufficient to give a million gallons per diem. And when we consider how many thousands of square miles of the absorbent strata outcrop on the margins of these immense depressions, it is obvious that there need be no anxiety as regards the permanance of the artesian flow of water."

Notes on the article entitled "On the word 'Kangaroo,'" by C. W. De Vis, M.A. (Vol. X., Proc. and Trans. Royal Geographical Society of Australasia, Brisbane).

By Edward Tregear, F.R.G.S., Etc.*

[Read at a Meeting of the Society, November 30, 1895.]

I do not presume to question the accuracy of Mr. De Vis' etymologies and comparatives when he deals with the Australian languages. It is a subject of which I know little, but when that writer breaks ground outside "the island continent," and speaks of Polynesian and Melanesian word-affinities, I may perhaps be allowed to draw attention to points on which he is liable to error.

The Oceanic languages are still under the philological microscope for dissection, so that no one can as yet speak with certainty as to the radix of any particular word, but it may not be considered premature to lay a few of the observed facts before your Society in regard to the inferences Mr. De Vis draws from one of his "Kangaroo-man" words. He states:—

"It should not be overlooked that the root of Kangar reappears in Melanesia as the root of the racial name Kanaka in which it signifies *man*. . . . It would be a very curious coincidence if the ancestral Myalls gave the Kangaroo names applied to man in the New Hebrides and New Zealand with no intention of signifying by them that they considered the beast in any way related to man."

That *Kangar* should be at the root of the racial word for man in Oceania seems to me improbable—even if there is such a racial word common to the black Melanesian and the brown Polynesian. It is true that *Kanaka* is a widely-spread word in the Pacific now, but it is a mere migratory effect, a trading word which has grown up with the labour traffic in the South Seas. *Kanaka* is a dialect word; it belongs to the dialect of

* Mr. Tregear is the Secretary of the Polynesian Society, and author of "The Maori-Polynesian Comparative Dictionary," &c. &c.

Hawaii in the Sandwich Islands. The letter-change in that island from pure Polynesian is to put K for T, and N for NG.

Take the following examples :—

Polynesian proper.	*Hawaiian.*
Tai, the sea	Kai
Tangaroa, a sea-god	Kanaloa
Tangi, to lament	Kani.

This is the regular change—the "Grimm's Law" of the Pacific. Follow this rule—

Tangata, a man	Kanaka.

That the true form is *tangata* there can be little doubt. It is in Maori *tangata* ; Samoan, *tagata* ; Tahitian, *taata* ; Tongan, *tagata* ; Paumotuan, *tagata* ; Easter Island, *tangata*. These are all pure Polynesian dialects, and in those where the letter is written *g* it is pronounced *ng*, so that the sound in all is identical. This shows the high probability that *tangata* is the original form, since it is unlikely that these island-groups (some of them thousands of miles distant from others) would have agreed to corrupt the word *Kanaka* into *tangata*. It is much more likely that the single dialect of Hawaii altered its form. It is doubtful whether even in the one locality—*i.e.*, Hawaii—the word *Kanaka* was ever certainly heard until the teaching of writing in native schools made that form classical and fixed. The early missionaries in Hawaii wrote it *tanata* ; the sound being between *k* and *t*. Now it is very decidedly *Kanaka* ; as such it has achieved a most undesirable prominence, and (as applied to blacks) a most undeserved signification.

The sailors of Hawaii, sought for as boat-steerers, &c., in whaling ships, seem to have spread this word about the Pacific. Nevertheless, as now used, it is mere sailor slang. The blacks brought to Australia as "labour" are mostly from the Solomons and other Melanesian islands. The Melanesian words for "man" certainly do not appear to be on the *Kangar* root. Such are *natimi*, *natimaig*, *tamoli*, *tatua*, *manesh*, *auna*, *mon*, *omani*, *tamsar*, *tau*, &c. It might as fairly be urged that *omani* was related to "old man kangaroo" as to *Kangar*.

I feel convinced that when Mr. De Vis said that the Australian word *Kangar* was on the same root as the racial word *Kanaka* he was wrong. There is no such racial word ; the word to be compared is *tangata*.

Report on the Sixth International Geographical Congress, London, 1895.

By Hugh Robert Mill, D.Sc., Etc.

(Delegate of the Royal Geographical Society of Australasia, Queensland)

[Read at a Special Meeting of the Society, January 17, 1896.]

It has been a source of great satisfaction to me to be honoured by the nomination of your Council to act as your Delegate at the Sixth International Geographical Congress, which was held recently in London ; but I could have wished that your choice had fallen upon a member of the Congress, who had better opportunities of taking part and reporting upon the various discussions. My duties as one of the Secretaries of the Congress necessarily demanded much of my time in attending to matters of business routine, and made it impossible for me to speak in your name so frequently as I should like to have done, or to report to you at as early a date as I wished to do.

International congresses of geographers have held at various intervals during the last twenty-three years. The first was brought together at Antwerp in 1871, on the occasion of the unveiling of statues of the great Flemish geographers, Ortelius and Mercator; the second at Paris in 1875; the third at Venice in 1881, when the King and Queen of Italy attended many of the meetings, and a magnificent exhibition was installed. In 1889 the fourth congress met somewhat informally at Paris in connection with the great exhibition of that year, and in 1891 the fifth meeting took place in Berne. It has been the invariable rule that the chief geographical society of the country where the congress meets should undertake the responsibility of organising it, and that the president of that society for the time being should be *ex officio* president of the congress. The Royal Geographical Society accordingly took the matter up, but made a new departure by appointing an Organising Committee on which all British geographical societies were represented, and some cognate

bodies, such as the Royal Colonial Institute, the Society of Arts, and the Imperial Institute. Major Leonard Darwin, Hon. Sec. R.G.S., accepted the chairmanship of this committee in order to relieve the President, Mr. Clements R. Markham, C.B., of part of his very arduous duties, and on the election of the committee in 1892, Mr. J. Scott Keltie, Assistant Secretary of the Royal Geographical Society, was appointed secretary, a post the duties of which I was asked to share with him in 1893. During the meeting the secretaries were assisted by the most energetic young British geographers and by some travellers and linguists of established reputations, to whom special praise must be given, for many of them devoted their whole time to tedious and often trying office work, voluntarily foregoing the pleasure of attending the meetings and the entertainments of the Congress, in order that all arrangements for the reception and assistance of members should work smoothly. The names of these assistant secretaries are :—J. Theodore Bent, Miss Cust, G. G. Chisholm, B. V. Darbishire, H. N. Dickson, E. Heawood, A. J. Herbertson, J. F. Hughes, A. V. Markoff, J. Boyd Miller, H. Yule Oldham, H. S. Schlichter, A. Silva White.

The duties of arranging for the various receptions and the exercise of hospitality to foreign members were shared by Sir Clement Hill and Mr. Delmar Morgan ; while the Exhibition was organised under the special superintendence of Mr. E. G. Ravenstein, Mr. John Coles and Mr. John Thomson. The problem of arranging the Exhibition was made very difficult by the scattered position of the rooms provided by the Authorities of the Imperial Institute on payment of a heavy rent. The great expense involved in holding all the meetings at the Institute was in large measure justified by the unequalled facilities for such a Congress presented by the great building, the whole of which—club rooms, museum, and gardens—were thrown open to all the members.

The number of names enrolled exceeded 1,500, of whom, unfortunately, a considerable number (including several eminent Australians) were unable to be present. The attendance at the opening meeting, however, exceeded 1,200, and more than 400 foreigners attended, every country in Europe being represented ; over 120 came from France alone, 60 from Germany, and 30 from the United States.

The proceedings of the Congress commenced with the private reception of the Delegates of Governments and of Geographical Societies by H.R.H. The Duke of York, Honorary President, at 8.30 on the evening of Friday, 26th July. Only the delegates and the ambassadors or other representatives of the various Governments were present at the ceremony which lasted for half an hour. The Delegates were introduced by the representatives of their Governments, those for the Colonies by the Agents-General, and the Duke of York cordially shook hands with each. A general meeting to welcome the Congress was then held in the great hall, when the Duke of York and Mr. Clements Markham gave short and hearty speeches of welcome, and a *conversazione* in the Gardens of the Imperial Institute gave the geographers an agreeable opportunity of renewing old acquaintances and forming new ones.

On the following day, serious work commenced with a suggestive address by the President, in which he made special reference to the pressing importance of placing geography in its proper position in education, and very strongly advocated the renewal of Antarctic exploration. At this meeting forty acting vice-presidents were appointed, including the most eminent geographers of every country represented, to form a consultative committee, and to relieve the President in the chair when other duties prevented him from presiding. It was felt to be of the utmost importance that all members of the Congress should have an opportunity of meeting daily to discuss the matters of greatest general interest, and to vote upon any proposals submitted to the Congress for adoption. This meeting, termed "A" for convenience, took place daily from 10.30 a.m. until about 1 p.m. In the afternoon more technical papers, dealing with subjects of exceptional interest to specialists, were read in two sections, called "B" and "C," care being taken that subjects in which the same people would likely be interested were not presented in each section simultaneously. Any decision come to in these sections had to be reported upon by the Vice-Presidents and ratified by the general meeting before it was officially accepted by the Congress.

It would be impossible to summarise the papers read. They will all be published with a summary of the discussions on them

in the Official Report. A few, however, stood out before the rest and attracted much attention. Amongst these were the papers by Professor Neumayer, formerly of Melbourne, now of Hamburg, and by Mr. C. E. Borchgrevink on the Antarctic regions. Much enthusiasm was evinced by everyone present, not least by Sir Joseph Hooker, the veteran of Sir James Clark Ross's expedition, and the resolution which is noted below was carried with the heartiest unanimity. The discussion on the conditions of European life in tropical Africa, including such well-known men as Sir John Kirk, Count Pfeil, Slatin Pasha, and Mr. H. M. Stanley, was particularly animated, but the most admirable temper was shown throughout, and it is pleasant to be able to record that representatives of interests which are actively competitive, if not hostile, in all parts of the world, met on a common basis of scientific criticism and personal friendliness. That the rest of the work of the Congress was serious and sound is to be seen from the list of resolutions adopted, which is appended to this Report.

On Saturday, August 3rd, the resolutions were formally presented and voted upon, and the President dissolved the Congress in a brief valedictory address. Invitations from Washington and Berlin were laid before the meeting, and after a little discussion, Berlin was chosen, with the concurrence of the American Delegates, as the most suitable place for the Seventh Congress, the date of which was fixed as 1899. The Executive Committee, consisting of the President, the Chairman of the lapsed Organising Committee, and the two Secretaries were appointed to carry out the resolution of the Congress and report to the meeting at Berlin ; thus, for the first time, continuity of administration has been secured for the Congress as an international institution.

During the whole meeting the British members treated the colonial and foreign visitors as their guests ; the first place in all the entertainments being given to the non-English-speaking foreigners, the second to Americans, the third to visitors from the colonies, and fourth—which on occasions when the numbers were limited was frequently omitted altogether—to the British members. Reference must be made in conclusion to the splendid hospitality of the Baroness Burdett-Coutts, Lord

Northbrook, the Right Hon. G. N. Curzon, Mr. Thistleton-Dyer, and above all to Mr. Clements L. Markham and Mrs. Markham, who entertained all the members at a farewell reception on Friday, August 2nd.

APPENDIX.

The resolutions come to by the Congress are as follow :—

1. That the officers of each Congress continue to act until the organization of the following Congress, in order to—

(1) Carry out as far as possible the resolutions of the last Congress;

(2) To keep up relations with the special committees which may be appointed;

(3) To communicate with the Organizing Committee of the following Congress regarding all questions pending;

(4) To present to the following Congress a report on the work done in the interval.

Presented by Prof. Brückner on behalf of the Berne Geographical Society.

2. That the Congress deems it desirable that greater facilities be provided for the purchase of periodical literature devoted to geography. It is therefore recommended to societies and other publishers of geographical periodicals, that they print in their publications the price of annual subscription, and of single and supplementary numbers, including postage, giving rates both for the country of publication and the countries in the Postal Union.

That the President appoint a Committee of one respectfully to communicate this recommendation to the societies and other publishers of geographical periodicals; and the Committee be requested to obtain from those societies and publishers, as far as practicable, the desired information, to collate it, and to send, as early as possible, a copy of this price list of periodicals to the various publications, in the hope that it may thus receive wide publicity.

That the Committee be requested thoroughly to revise and promulgate this list annually as far as may be done in the manner above described, until the meeting of the Seventh Annual Geographical Congress.

Presented by Mr. Cyrus Adams, of New York.

3. That the Congress records its opinion that the exploration of the Antarctic regions is the greatest piece of geographical exploration still to be undertaken. That, in view of the additions to knowledge in almost every branch of science which would result from such a scientific exploration, the Congress recommends that the scientific societies throughout the world should urge, in whatever way seems to them most effective, that this work should be undertaken before the close of the century.

Proposed by a Committee composed of M. Bouquet de la Graye, M. de Gregoriev, Sir Joseph Hooker, Dr. John Murray, Prof. Neumayer, Lieut.-Colonel Shokalsky, and Prof. von den Steinen.

4. That the Permanent Bureau should follow out the study of geographical bibliography; and that it be authorised to associate with itself competent persons, and to give them the necessary powers for prosecuting the inquiry.
5. That the Congress expresses the opinion that all civilized countries which have not yet joined the International Geodetic Association should be invited to do so.

Proposed by General Ferrero, the Italian Ambassador.

6. That it is desirable to bring to the notice of the Geographical Societies interested in Africa the advantages to be gained—

(1) By the execution of accurate topographical surveys, based on a sufficient triangulation, of the districts in Africa suitable for colonization by Europeans.

(2) By encouraging travellers to sketch areas rather than mere routes.

(3) By the formation and publication of a list of all the places in unsurveyed Africa, which have been accurately determined by astronomical observations, with explanations of the methods employed.

(4) By the accurate determination of the position of many of the most important places in unsurveyed Africa, for which operation the lines of telegraph already erected, or in course of erection, afford so great facilities.

Introduced by General Chapman.

7. That the following resolutions drawn up by the Commission appointed at the Fifth Congress relative to the preparation of a map of the World, on the scale of 1 : 1,000,000, be adopted by the Congress :—

(1) The Commission has received the Report of the Berne Committee, and feels grateful for the work done by it.

(2) The Commission declares that the production of a map of the Earth to be exceedingly desirable.

(3) A scale of 1 : 1,000,000 is recommended as being more especially suited for that purpose.

(4) The Commission recommends that each sheet of the map be bounded by arcs of parallels and of meridians. A polyconical projection is the only one which is deserving of consideration. Each sheet of the map is to embrace 4 deg. of latitude and 6 deg. of longitude up to 60 deg. north, and 12 deg. of longitude beyond that parallel.

(5) The Commission recommends unanimously that the meridian of Greenwich and the metre be accepted for this map.

(6) The Commission recommends Governments, institutions, and societies, who may publish maps, to accept the scale recommended.

(7) The Commission lays down its mandate, and recommends that the Executive Committee of the Congress be charged with the duty of carrying on its work, and be authorized to co-operate for this purpose with scientific men representing various countries.

This was proposed by General Sir Charles Wilson.

8. The Congress expresses the hope that those countries which have not published graphic catalogues of maps should be invited to do so, and that geographical societies be recommended to interest themselves in the matter.

Proposed by Dr. de Gregoriev (St. Petersburg).

9. That the Congress recognizes the scientific and economic importance of the results of recent research in the Baltic, the North Sea, and the North Atlantic, especially with regard to fishing interests, and records its opinion that

the survey of these areas should be continued and extended by the co-operation of the different nationalities concerned, on the lines of the scheme presented to the Congress by Prof. Pettersson.

Proposed by a Committee of Oceanographers.

10. The Congress acknowledges the utility, and, indeed, the scientific necessity, of an international system of stations for the observation of earthquakes.

Proposed by Dr. Gerland (Strasburg).

11. The attention of this International Congress having been drawn by the British members to the educational efforts being made by the British Geographical Societies, the Congress desires to express its hearty sympathy with such efforts, and to place on record its opinion that in every country provision should be made for higher education in geography, either in the universities or otherwise.

Proposed by a Committee of Educationists.

12. This Congress expresses its approval of the principle of *State-printed Registration of Literature* as the true foundation of National and International Bibliography, and approves the appointment of an International Committee to further the said object, the constitution of the Committee to rest with the Bureau of the International Geographical Congress.

Proposed by Mr. Frank Campbell, as more precise than No. 4.

13. That the Congress put on record its opinion that all geographical maps should bear the date of their completion, in order to obviate the errors which would otherwise be apt to arise.

Proposed by M. Jacques Léotard, of Marseilles.

14. That the Congress request the Geographical Societies represented on it to consider the question of the application of the decimal system to angular and time measurements, and to report on the subject to the next Congress.

Proposed by M. de Rey Pailhade, of Toulouse.

15. That the Committee of the next International Geographical Congress be charged—

(1) To print and circulate to all geographical societies a list of the notes and resolutions carried at the preceding Congresses.

(2) To request each geographical society to send in a short report on the progress made in their country on the subjects referred to.

(3) To appoint a reporter to the next Congress, who shall submit a general summary of progress made in the subjects considered.

Presented by M. Mullhaupt de Steiger, of Berne.

The Rock Pictures of the Australian Aborigines.

[With Plates I and II.]

By R. H. Mathews, Licensed Surveyor.

[Read at a Meeting of the Society, Saturday, April 25, 1896.]

In 1894 I contributed a paper to the Royal Geographical Society of Australasia, Queensland Branch, on the "Aboriginal Rock Pictures of Australia."* In that paper I have fully detailed the manner in which the different styles of paintings and carvings are produced by the native artists, and have noted their geographical distribution throughout Australia, with some remarks on their probable age and significance. It will not, therefore, be necessary in the following pages to again refer to these parts of the subject. Since then I have continued my researches, and have succeeded in making copies of several aboriginal paintings and carvings not hitherto recorded, which I propose to describe and illustrate in the present paper.

The subject of native drawings, found in various parts of Australia, showing the imitative faculties of a primitive people, is one of wide importance and permanent interest. There is still a large unworked field in Australia in regard to aboriginal art, and I hope that all those who are able to copy and describe these rock pictures, and have opportunities for doing so, will endeavour, on every occasion which presents itself, to prepare accurate *fac-similes* of as many as possible, in the hope of obtaining a clue to the picture writing of Australian tribes.

For the information and assistance of students who may be desirous of doing useful work in this branch of Anthropology, I would like to state that the only satisfactory way of reproducing these drawings is to adopt the following method, which I will endeavour to briefly explain. On arriving in a cave containing native paintings, the first thing to be done is to make a careful sketch of the outlines of all the figures in the relative order in

Proc. Roy. Geog. Soc. Aust., Q. Branch, vol. x., pp. 46-70., pls. ii and iii.

which they appear on its walls; then take a sufficient number of measurements, noting the dimensions on each figure in the sketch; and at the same time fix by measurements the relative position of each figure. For black lines a black lead pencil should be employed; and for red or yellow, use crayons of these colours. For white, use the black pencil, making a note "White" on all the lines which are of that colour. Being satisfied that all the necessary dimensions for the accurate reproduction of every drawing are taken, next measure the length, depth and height of the cave, this information being valuable for future identification by other investigators. Note also the character of the floor, and whether there are stains of smoke on the roof, or other signs of former habitation. The kind of rock should be noted, and also whether it is a continuous escarpment or an isolated boulder. I use a good pocket compass for observing the direction in which the cave faces, noting also at the same time its bearing and approximate distance from the nearest purchased land, or other well-known point. If there is permanent water, or a suitable camping-place near, the fact should be stated. Enquiries may be made as to how long the cave has been known to Europeans, or on any other points which may suggest themselves to the student as likely to be of value, or which would help to identify the locality.

In making my notes of carvings found on rocks, I adopt a somewhat similar course, sketching and measuring every figure. The width and depth of the grooves along the outlines should be measured, and the direction which the rock slopes stated. The locality, kind of rock, nearness of water, &c., mentioned in regard to the paintings, should also be given. For taking the measurements I use a tape measure, 66ft. long, graduated to feet, inches, and half-inches, fitting in a case into which it can be wound up when not in use.

In several of the cave paintings which I have visited, many of the figures were scarcely distinguishable, and required to be viewed from different standpoints before they could be made out. When these paintings are very indistinct, I have found that one can see them better by standing a few yards off than when close to them. As regards the carvings, many of them are very much weather-worn, and so nearly obliterated that it

requires some practice to be able to discern them at all; whilst others are clearly defined and can be seen without difficulty. Those situated on flat rocks are more easily seen on sunny than on cloudy days; but the best time to observe those which are very faint is either on a dewy morning after sunrise, or any time after a shower of rain; the dew or the rain, as the case may be, collects in greater quantities in the grooves than elsewhere, and indicates their position. I remember on one occasion visiting a large flat rock on which were carved about 30 figures of different objects. I had, as I thought, completed taking them all in my note-book when a thunderstorm came on, during which I took shelter under a leaning tree. When the shower was over, I came out, and before starting away, took a "last look" over the rock, and was rewarded by finding the figure of a woman, 11ft. 3in. high,* the most important discovery of the day, which I would otherwise have missed altogether, owing to the extreme faintness of its outline.

From the above remarks it is obvious that these rock paintings and carvings will become fainter and fewer in number every year, and in course of time will disappear altogether; therefore every person who is competent to do his share of the work should assist in rescuing these specimens of native art from oblivion. If any protracted delay takes place in the carrying out of the work suggested, much information which could now be secured will be lost to science.

Thus far I have dealt with the modes of *collecting* information, but after it has been obtained it is important that it should be *published* through such channels as will make it of permanent interest and value. I would suggest that all societies in Australia and Europe, which have amongst their objects the diffusion of knowledge of this character, should welcome contributions of the kind referred to, and in cases where they are of sufficient merit, to publish them. They would be discussed by different members who are able to do so by reason of complete acquaintance with the subject.

To those unaccustomed to the preparation of the Plates required in these researches, a few practical directions relating to this part of the subject may be found of some assistance.

*This interesting carving is shown as Fig. 2, Plate XVI., illustrating my paper on "Rock Paintings and Carvings of the Australian Aborigines," *Journ. Anthrop. Inst.*, Vol. xxv., pp. 145-163.

In reproducing cave paintings from the notes taken in the field, crayon paper of a sandstone colour may be used to represent the rock. All the paintings in any given cave should first be outlined in pencil in their relative positions from the sketches and measurements given in the field-book, and then drawn in the proper colour in which they appear on the rock. A brush or a pen will be used for this purpose according to the kind of drawing to be depicted. Chinese white may be used for that colour, vermilion for red, Indian ink for black, Chrome yellow for that colour, and so on. The rock carvings may be drawn on any suitable white paper in pencil as in the case of paintings, and afterwards drawn in with Indian ink. A convenient scale for the Plates of both paintings and carvings is two feet to one inch, which was that adopted in drawing the originals of the Plates attached to this paper.

Plates for publication should be drawn the size, or some multiple of the size, of a page of the journal in which they are to be published. For example, a Plate to form one page of the journal in which this paper is printed should be about 7in. by 4½in. It is generally found more convenient, especially when the objects are small and numerous, to draw the Plate on a larger scale than that required, which can afterwards be reduced by photography or otherwise to the proper size for publication. Thus, a Plate intended for a single page would be drawn 14in. by 9in., if the scale were to be reduced to *one-half*; 21in. by 13½in if it were to be reduced to *one-third*, and so on. It is sometimes found necessary or convenient to use folding plates—two, or three, or four times the width of a page but not exceeding the length. From the preceding remarks the reader will have no difficulty in understanding how to draw these folding plates on a large scale for reduction to the proper size.

Few men are capable, and fewer still are willing, without some personal advantage, to lend their assistance in collecting information respecting the aborigines; but it is hoped that the practical hints which I have here given may induce some of those residing in districts where these drawings are found to spare a few half-hours now and then for the purpose of copying and describing them in the way I have indicated. I hope it is

only necessary to point out the value of these specimens of native art to awaken an interest in them among people who would otherwise pass them by without notice.

I will now proceed to describe the several figures shown in the Plates annexed to this paper, following the arrangement adopted by me in the paper referred to in the opening paragraph, of dealing with the paintings and carvings under two separate heads. The Plate containing the rock pictures will be first described, and then will follow a description of the Plate illustrating the rock carvings. As all the paintings and carvings included in this paper are situated within New South Wales, it will not be necessary to add the name of the colony in the description of each Fig.

PLATE I.—ROCK PAINTINGS.

Fig. 1.—The most prominent object in this cave is the grotesque nude representation of a man, a little over 9ft. high, if the legs were close together instead of being extended. The top of the head is about 12ft. above the floor. From hand to hand measures nearly 17ft—the right arm being about a foot longer than the left, and both have a band around them about 2ft from the shoulder. The whole figure was first outlined in white, and the space within this outline was then shaded red by a number of strokes drawn in the direction of the body and limbs, which appear to have been done with some red substance held in the hand of the operator. The eyes are delineated in white colour, the right eye being somewhat larger than the left; and the nose and mouth are shown in red. This is much the largest and most remarkable human figure I have yet met with amongst the cave paintings of New South Wales.

On either side of the body, just below the arms, are some perpendicular lines, three being on the right-hand side and four on the left. Touching the right leg are three similar lines, and just above them are four more drawn on top of a left hand. All these lines are in white colour, and are evidently intended to convey some meaning. Above the right arm is an unfinished drawing of a kangaroo, outlined in white. The remaining figures consist of six hands—the right and left being equally represented—two tomahawks, a waddy, and three boomerangs, all executed in the stencil method, in white colour.

This cave or rock shelter is in an escarpment of Hawkesbury Sandstone, situated within Portion No. 2 of 640 acres, in the parish of Milbrodale, county of Northumberland. It is 58ft. long and 23ft. high, the greatest depth being about 22ft. It faces the north-east, and there is permanent water in Bulgar Creek close by, but the cave does not appear to have been much used as a camping-place of the natives.

An incomplete drawing of some of the objects in this cave was published in Plate XIX, in the *Journal of the Royal Society of New South Wales*, Vol. XXVII., illustrating one of my papers on aboriginal rock pictures. On again examining the cave, with the aid of experience gained in other places, I distinguished some lines and figures which had previously escaped my notice.

Fig. 2.—In this cave there is now visible a group of six hands, four of which are evidently those of children, and are all stencilled in white colour.

The cave or shelter is situated about two chains westerly from Doughboy Beach, a small indentation in the left shore of Berowra Creek, a tributary of the Hawkesbury River, in the parish of Berowra, county of Cumberland, and is about ten chains easterly from the south-east corner of Portion No. 7 of 40 acres in that parish. The shelter is 20ft. long, average depth about 6ft., and height 5ft. 6in., and it faces N. 50degs. E. The floor consists partly of stone and partly of earth; among the latter are numerous oyster and mussel shells, which, with the smoke-blackened roof, indicate that it has been used as a camping-place by the aborigines.

Fig. 3.—This cave is situated in a large sandstone rock on the hillside at Bar Point, on the left shore of the Hawkesbury River, within Portion No. 3 of 50 acres, in the parish of Cowan, county of Northumberland. It is eight or ten chains back from the shore of the river, and faces S. 30degs. W. The floor consists of shells and earth several feet deep, and the roof is black with the smoke of many fires. The length of the cave is 41ft., average depth 12ft., and the height of the roof varies from 6ft. 6in. to 9ft.

On the back wall are faintly distinguishable about a dozen hands executed in white stencil, three of the best of which are here reproduced in their relative position. Fresh water is

obtainable in a little gully about a quarter of a mile northerly from this rock.

Fig. 4.—The cave containing these paintings is at Doughboy Beach, a few chains farther up the hill, in a north-westerly direction from the cave which Fig. 2 represents. It is 27ft. long, 6ft. high, 10ft. deep, and faces N. 50degs. E. The floor consists of earth mixed with shells, and the roof is blackened by smoke, indicating that the place was formerly inhabited by aborigines. It is in a low escarpment of Hawkesbury Sandstone about five chains back from high water. Fresh water is obtainable for some time after rain in a little gully running down the hillside a few chains distant.

The paintings now visible consist of one left hand and three right hands, one of the latter being that of a boy or girl, judging by its smaller size.

Fig. 5.—These paintings are found in a small cave or rock shelter on the right bank of a freshwater gully running into Kangaroo Bay, a shallow inlet on the western shore of Berowra Creek. The cave is about two or three chains up the gully from the head of the Bay, and is situated within Portion No. 163 of 40 acres, in the parish of North Colah, county of Cumberland; it is in a precipitous escarpment of Hawkesbury Sandstone which bounds the creek at this place. The length of the shelter is 13ft., depth 6ft. 6in., height 8ft., and it faces N. 55degs. W. There are no indications of smoke on the roof, and the floor consists of solid stone.

There are seven human figures drawn in black on the back wall of the cave; the two larger ones appear to be women, having the mammæ delineated in the usual way, and the others are either intended for children, or are drawn on a smaller scale. Two of the smaller figures appear to be females, but the sex of the other three is not distinguished. The two larger figures are respectively 15in. and 16in. high. and the smallest 7in. Close by one of the women is a round black disc, 3½in in diameter. There is an oval object, 3in. by 2in., resembling a shield near one of the small human figures. The remaining drawings in this cave comprise a stencilled right hand and a native tomahawk.

Fig. 6.—These drawings are found in a shelter in a bluff rock of Hawkesbury Sandstone, some 40ft. from the right bank of

Smith's Creek, about a mile and three-quarters above its junction with Cowan Creek, a tributary of the Hawkesbury River, in the parish of Broken Bay, county of Cumberland. This shelter faces S. 60deg. W., and the floor consists chiefly of shells and rubbish, collected by the natives who have apparently used it as a camping-place for a long period. Its length is 24ft., depth, 12ft, and height, 10ft. There is a permanent freshwater spring in a small gully about half a chain distant from the cave.

The paintings consist of a quadruped which may have been intended for an opossum or a dog, with a fish drawn upon its body in a darker colour; another animal, which was perhaps intended for a wombat; and two other objects which probably represent shields or perhaps fish. The larger one is 2ft. 10in. long, and the smaller, 1ft. 6in. All the figures in this cave are drawn in black colour.

Fig. 7.—This cave is situated in a low escarpment of Hawkesbury Sandstone, about two and a-half chains from the right bank of Reedy Creek and about three-quarters of a mile north-easterly from Portion No. 30 of 80 acres, parish of Rumker, county of Phillip.

The rock shelter is 25ft. long, 11ft. deep and 11ft. high. It faces S. 50degs. E. and has the smoky roof and walls common to caves which have been used as places of residence. The floor consists of sandy soil and ashes.

The first figure on the left of the spectator is the representation of a left hand in red stencil. Then follows about 10ft.* of the wall on which are discernible a few red patches, but no figures are distinguishable owing to disintegration of the surface. Next is a group of three hands, two of which, a left and a right, are executed in white stencil, with a right hand between them done in red stencil. About a foot below the last-mentioned hands is a representation of a boomerang in white stencil, the weapon having been placed against the rock and a white colour blown around it.

The drawings in this cave have the appearance of being very old, and are further very interesting on account of both white and red stencilling being found grouped together in the same cave.

* In order to save space on the Plate, this distance is there shown as about 6ft. instead of 10ft.

Fig. 8.—This cave, which is simply an overhanging rock shelter, in an ordinary rocky escarpment of the Hawkesbury Sandstone, is situated on the western side of the ridge, dividing the waters of Davis' Swamp from those of Cox's Creek, about a quarter of a mile easterly from the eastern boundary of Portion No. 49 of 160 acres, parish of Coolcalwin, county of Phillip.

The length of the shelter is 23ft., its depth, 10ft., and its height, 10ft., the space having been hollowed out by atmospheric influences. The floor is sandstone, and there are no indications of the recess having been occupied by the aborigines as a place of residence. There is no permanent water nearer than Cox's Creek or Davis' Swamp, either of which would be about a mile and a-half away, but there are small gullies much nearer, in which water could be obtained during the winter months. The cave faces north-west.

On the left of the spectator, as he faces the recess, are six hands with the fingers pointing upwards towards the expanse of the cave. Then a hand and arm as far as the elbow, in a horizontal position, with the fingers pointing towards the other hands. About 2ft. to the right of the last described hand, is another with the fingers pointing upwards.

All the hands in this shelter are executed in red stencil, and are well preserved. Of the eight depicted, five are left and three are right hands.

Fig. 9.—The large cave in which these paintings are found is situated on the northern side of Long Island, one of several islands in the Hawkesbury River, parish of Cowan, county of Cumberland. The Great Northern Railway from Sydney to Newcastle passes over the eastern end of the island, connecting it with the southern shore of the Hawkesbury River by an embankment, and with the northern shore of that river by a long iron bridge.

The cave is hollowed out of the base of a rugged escarpment of Hawkesbury Sandstone, about two chains back from the shore line bounding the island, and faces N. 25 deg. W. Its length is 112ft.; the depth from the front to the back wall at the widest place, 19ft.; and the height of the roof above the floor varies from 8ft. to 12ft., owing to irregularities both in the roof and in the floor. The latter consists for the most part of sand which

has weathered away from the roof, but there are patches of loamy soil here and there amongst it, and in some places the bare rock is visible. There are traces of smoke on the roof, and cinders are found mixed with the soil on the floor, indicating that the cave has in former times been used as a camping-place by the aborigines. There is fresh water in a small gully on the southern side of the island, about a quarter of a mile from the cave, from which it is probable the natives obtained water for camp use.

There are still about 100 hands visible, some of which are easily seen, but most of them are barely discernible. It is probable that there were formerly many more hands than are now distinguishable, but they have been carried away by wasting of patches of the rock. These hands are stencilled in white colour, and are scattered along about 92ft. of the back wall of the cave. I have copied only twenty-one of these hands, because in the remainder of them it was impossible to definitely distinguish whether they belonged to the right or left hand.

In order to bring such a large number of paintings into the smallest possible space on Plate I, I have divided this cave into three sections—*(a)*, *(b)*, and *(c)*; the part *(b)* being a continuation of *(a)*, and the part *(c)* being a continuation of *(b)*—these three sections together representing a length of 92ft. of the cave wall.

As the spectator stands facing the back wall, the objects on his extreme left, near that end of the cave, consist of a native tomahawk with handle, and five left hands, one of which has part of the arm attached. Farther to the right is another group comprising a right and a left hand, between which is another native tomahawk with handle. Above and to the right of the last described, are two boomerangs and two native clubs. Attention is drawn to the unusual manner in which the stencilling has been done around the margins of these weapons. The pipeclay has evidently been applied to the rock in a liquid or pasty state, either with some kind of mop or brush, or was blown in a moist state out of the mouth. A short distance below the two clubs is stencilled the figure of a fish, 18in. long and 6in. across the widest part of the body. A fish has evidently been held against the rock and the colouring matter

applied around it. The next object is another native tomahawk with handle, and below it what appears to be intended for an eel, 18in. long, has been outlined in red colour.

Farther to the right, near where the back wall meets the roof, is the point of a native spear, showing two of the barbs, perhaps used in spearing fish. Next follow three boomerangs, and below them are four small objects which may have been intended for native tomahawks without handles. The next object is a very perfect figure of a fish 11in. long and 4in. wide, showing the mouth and a ventral fin. Close to the last described is a boomerang, below which are three small hands—two left and one right.

The next figure is a fish 2ft. 6in. long and 1ft. across the body. It is drawn in solid black colour and has a pectoral and a ventral fin. Partly covering the body of the fish and executed subsequently to it are three left hands, and below these is a boomerang. Farther to the right is a club nearly 4ft. long, drawn in solid red; above this are three boomerangs, and above the latter are three right hands in the shut position, which are comparatively uncommon in native drawings. Close by the last described is the head of a fish showing the mouth, the remainder of the drawing having been carried away by the weathering of the rock.

The next drawing is a boomerang, with a left hand not far from it. Then there is a considerable space on which several indistinct stencillings of hands may be detected, amongst which is a well-defined left hand in the shut position. Continuing on towards the right, there are discernible on the cave-wall faint outlines of what appear to be intended for human figures, fish, a kangaroo, and other objects, some of which are drawn in black and others in red, but too indistinct for anything definite to be made out from them.

At the end of the space referred to, there is a crack or fissure in the cave wall which I have shown on the Plate, in order that it may be used as a sort of "reference point" by future visitors to the cave. The next drawing is a boomerang, close to which is a very small left hand, apparently that of a very young person; and a little farther on is the left hand of an adult.

The last figure in this cave represents a man drawn in red outline, 2ft. 8in. high, with his arms and fingers extended,

having five lines, seven inches long, radiating from the top of the head, as if to indicate ornaments stuck in the hair. The only features now discernible on the face are the eyes; if the nose and mouth were originally delineated they have disappeared by the natural decay of the rock. The feet are turned inwards, which is an uncommon position in native drawings, the toes usually pointing outwards. Partly covering portions of the body of the human figure are two left hands stencilled upon the rock at a later date.

All the hands, tomahawks, boomerangs, two clubs, some fish, the barbed spear-head, and a few small objects, are executed in the stencil method of drawing, and are all in white colour. The human figure, a club, and what is supposed to be intended for an eel, are drawn in red. One of the fish is drawn in solid black colour, as previously stated.

Fig. 10.—This cave is in the end of a large boulder of Hawkesbury Sandstone, embedded on the slope of a hill, about five chains south-easterly from the Hawkesbury Railway Station, within Portion No. 9, of 100 acres, parish of Cowan, county of Cumberland. Its length is 12ft., and it extends 8ft. back into the rock. Its height at the entrance is 5ft. 6in., which increases to 6ft. inside, on account of the dome-shaped roof. There is one right hand and four left hands stencilled in white colour on the back wall of the cave, which is crescent-shaped. There are smoke-stains on the roof; and on the floor, which consists of a mixture of soil and sand, there are remains of cinders, showing that the aborigines have used the rock-shelter as a camping-place. The cave faces the west, and there is a stream of permanent fresh water in a small gully a short distance southerly from it.

PLATE II.—ROCK CARVINGS.

Fig. 1.—This interesting group of native carvings is on a flat rock of Hawkesbury Sandstone, whose surface is raised only a few inches above the level of the adjacent ground, and distant a few yards from the western side of the old road from Sydney to Peat's Ferry, about a mile and a-quarter northerly from Vize Trigonometrical Station, parish of Cowan, county of Cumberland. The road at this place follows the top of the range dividing the waters of Peat's Bight Creek from those of Seymour

Creek, in both of which there is permanent fresh water. The group consists of five men, a woman, and a human hand, all shown in the Plate in their correct relative positions exactly as they appear on the rock. I will divide them into seven sections (*a*) to (*g*) for the purpose of more clearly describing all the figures.

(*a*) This carving represents a man in the attitude of dancing, having in his left hand a club or "wooden sword," with another somewhat similar weapon with a falcate end, apparently stuck in his girdle. Mr. Collins* says "that the native men of the district around Sydney carried wooden swords in their girdles"; and Captain M. Flinders† in speaking of some paintings at Chasm Island, describes the figure of a man who held in his hand something "resembling the waddy, or wooden sword, of the natives of Port Jackson." Captain W. Tench‡ in speaking of the aborigines of Botany Bay and Port Jackson says, "They have, besides, long wooden swords, shaped like a sabre, capable of inflicting a mortal wound."

The eyes are shown and eight lines about a foot long rising from the head, probably representing feathers or some other ornament. There are lines across each of the arms at the shoulders. The length of the body is out of proportion to the rest of the figure and one leg is longer than the other—remarks which apply to all the figures in the group.

(*b*) This curious figure of a woman is joined to the last figure by a double line about 8ft. long connecting their generative organs, and is apparently illustrative of sexual intercourse. The mammæ are delineated in the way usually employed by the natives in representing women, and the belly is very large, perhaps intended to indicate that she is *enceinte*. There is a belt around the waist, another round the chest under the mammæ, and a band around the right arm at the shoulder. The eyes are the only features delineated, and there are no ornaments on the head. Below the belt which crosses the body under the mammæ are two other lines, the purpose of which I am unable to state.

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* "Account of the English Colony in New South Wales," 1798; Vol. 1., p. 567.

† Voyage to Terra Australis," Vol. II., p. 189.

‡ "Narrative of the Expedition to Botany Bay," 1789; Second Edition, p. 87.

(*c*) This rudely drawn figure represents a male and is the largest one of the group. The arms are raised above the head, and there are four fingers on each of the hands, which, in this respect, resemble those of the woman.

(*d*) This is another roughly drawn male figure, having a line across the neck, perhaps intended for a neckband.

(*e*) Another figure, probably a male, with five fingers on one hand and none on the other. The body, which is very much elongated, has a belt around the middle part of it.

(*f*) This probably represents a male, with a belt around the waist, and bands around the arms near the shoulders. One of the feet is fairly well drawn.

(*g*) This representation of a hand, cut into the rock like the other figures, completes the group.

This group is interesting on account of showing some of the positions assumed by the natives in dancing. Lieut. W. H. Breton, in speaking of some of the customs of the natives near Wollombi, New South Wales, between the years 1830 and 1833, says :—" One of their dances commenced by great adorning of their heads with feathers, etc., after which they formed a circle round four women and then began dancing. The women were on their knees and threw their heads about as if knocking them against the ground. At intervals they threw up their heels like an animal when kicking, the whole party at the same time yelling in concert in the most hideous manner imaginable, and with as much regularity as if a master had been at hand to direct them. After this had continued some time the women raised themselves on their hands and feet, the men still dancing round them and accompanying their movements by the most libidinous gestures. The remainder of the dance was far too disgusting to bear description."—*Excursions in New South Wales, West Australia and Van Dieman's Land*; 2nd ed., pp. 177-178.

Mr. R. Sadlier says, " There are many kinds of corroborees. All have the song and the dance; both are, at times, very libidinous, especially the dance of the women."—*Aborigines of Australia*, p. 19.

Fig. 2.—This strangely designed group of figures are carved on the face of a sandstone boulder lying on the slope of a hill, about three-quarters of a chain from the right bank of Berowra

Creek, about ten chains below what is shown on the parish map as Frank's Bight, parish of Cowan, county of Cumberland. The face of the rock, from the ground upwards, slopes away from the observer at an angle of about 20degs. from the perpendicular and the carvings which are on the side towards Berowra Creek, are visible from the water.

The central figures of the group are suggestive of a woman with a child upon her lap. The larger figure has four longitudinal stripes on the body, a belt around the waist, a band across the thigh, and another on the arm; there is also what appears to be a head-dress. Beside this figure are a number of lines resembling those cut upon the ground and upon trees, and known as "yammunyamun" among some tribes. These lines terminate behind the nether part of the body in an object resembling a human foot.

The smaller figure, which may be intended for a child, has also a belt around the waist, and the line forming the lower side of the arm is continued across the body; the only features shown are the eyes.

The roughly drawn male figure on the right hand of the spectator is 4ft. 4in. high, 14in. across the body at the belt, and has five lines varying in length from 11in. to 7in. rising from the head. One arm has a band around it, and four fingers are shown on the hand, but the other arm is very rudimentary. Each of the legs, which consist of a single line, terminates in four divisions, apparently intended to represent the toes. At the end of the penis there is an oval object 9in. by 4½in., which I am unable to identify. Between this figure and the others are some more lines of the yammunyamun pattern previously referred to.

The presence of the "yammunyamun" devices on the rock is suggestive of its having been drawn to commemorate the burial-place of some of the natives, and the position of the first described figures points in the same direction. I merely throw out this as a suggestion without offering any opinion.

All the grooves of these figures are cut into the rock about half-an-inch deep and an inch and a-quarter wide. There is permanent fresh water in the small creek running into Frank's Bight.

Fig. 3.—This group, which among the sable artists who executed the work, may have been connected with some well-known story of an emu hunt, is on a flat rock level with the surface of the ground, on the western side of the cleared road from Pymble to Cowan Creek, *via* Bobbin Trigonometrical Station, and about half a mile southerly from the latter, in the parish of Gordon, county of Cumberland. It includes two emus,* the left-hand one being 7ft. 6in. from the bill to the tail, and 5ft. 3in. high, the corresponding measurements of the other one being 6ft. 10in. and 6ft. 7in. respectively, the latter having the eye delineated. In both birds only one leg is shown, and the foot is a straight continuation of the leg, a mode of drawing I have frequently observed in native figures of emus. There are two men, having their heads pointing in contrary directions, apparently lying on top of the emus; both have belts around their waists and bands around their ankles, the latter of which are unusual. The feet of the smaller man are turned inwards, a position which is not very common—the toes generally pointing outwards in opposite directions, whilst in some cases both the feet† are drawn in the same direction. A representation of hair or an ornamental head-dress is shown on the head of the latter. The larger figure has a band around one of his wrists, and appears to have hold of the leg of one of the emus. The smaller human figure apparently has a hand on each of the birds. There is a very shallow oval-shaped hollow in the rock, worn out, I think, by the weather since the carving was done, owing to its having been softer than the rest of the surrounding surface. The wasting of this oval patch has probably carried away some of the original lines of the figures, leaving them as they now appear. I have shown by dotted lines where it is probable grooves formerly existed. Nearly all the lines in this group have suffered considerably from the wasting influence of the atmosphere, combined with the erosion caused by water flowing over them during rainy seasons, consequently it requires careful observation to follow all the outlines of the figures.

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* Capt. Wickham mentions emus among the carvings described by him on Depuch Island, Western Australia.—*Journal Royal Geographical Society, London*, Vol. xii., pp. 82-83.

† See Fig. 6, Plate xcix., *Rep. Australas. Assoc. Adv. Sci.*, Vol. vi., p. 635.

An incomplete drawing of this group appears in the *Proceedings of the Royal Society of Victoria*, Vol. VII., n.s., Plate IX., Fig. 14, illustrating a paper contributed by me on "Aboriginal Rock Paintings and Carvings in New South Wales." Since that paper was printed I have again visited the locality and cleared away a quantity of earth and rubbish, exposing to view the complete group as it is now shown in the present paper.

Fig. 4.—The large carving of a kangaroo* here shown is 13ft. 1in. from the tip of the nose to the end of the tail. There is an incised line across the neck and also across the foreleg, and the animal appears to be in the attitude of jumping. The two fore or hind legs of animals are very seldom delineated in native drawings—one of each being the general mode of representing them.

This kangaroo is carved on a flat mass of Hawkesbury Sandstone about two chains long, level with the surface of the ground and sloping N. 20degs. E. It is about a chain from the left bank of a little fresh-water creek, emptying about a quarter of a mile distant into a small bay—a basin-like expansion of the north-eastern side of Yeoman's Bay, Cowan Creek, parish of Broken Bay, county of Cumberland.

Fig. 5.—This colossal representation of a man bearing a shield† in his right hand is carved on a large sandstone rock, sloping gently towards the north-east, a few yards from the south-western side of the old track leading from Portion No. 71 of 100 acres, parish of Broken Bay, county of Cumberland, towards Tabor Trigonometrical Station. There is permanent water in a small gully about half-a-mile away.

From the top of the head to the feet is 18ft. 6in., and the greatest width across the body 5ft. 7in. There is a belt around the waist and a band around the left arm; the eyes and mouth are shown, but not the nose. There are four horn-like appendages rising from the head which are probably intended to represent ornaments stuck in the hair. On the right arm is an incised line 16in. long, and on the chest an unfinished oval figure which I cannot identify. The breadth of the shield is

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* A kangaroo is mentioned by Captain Wickham in his list of carvings on Depuch Island.—*Loc. cit.*, p. 83.

† Captain Wickham mentions having seen a man with a shield among the carvings on Depuch Island.—*Loc. cit.*, p. 82.

2ft. 2in. and its length 4ft. 4in., with small lozenge-shaped spaces at each end. It has a longitudinal and a transverse bar carved upon it. The left foot is represented facing straight out, which is very unusual, and has six toes ; the right foot is also foreshortened and has four toes. The general aspect of this man and his shield may be compared with Fig. 7, Plate IX., *Proc. Roy. Soc. Victoria*, Vol. VII., n.s., pp. 151-152.

Fig. 6.—This strange-looking figure is carved on a continuation of the same large rock as the last described, and is close to it. The extreme length is 25ft. 6in., and the width of the body, at the widest part, is 5ft. 7in. The body and fish-like tail suggest its having been intended for a large fish, whilst the head and arms, and what appears to represent the penis, would seem to indicate that it was designed for some monster of human shape. I have before described some curious monsters among native drawings, for examples of some of which the reader is referred to Fig. 10, Plate IX., *Proc. Roy. Soc., Victoria*, Vol. VII., n.s., p. 153 ; and Fig. 15, Plate III., *Proc. Roy. Geog. Soc. Aust., Qld. Branch*, Vol. X., p. 70.

Fig. 7.—A shield, 5ft. 2in. in length and 2ft. 4½in. broad, with a longitudinal and transverse bar—the former being flexuous, as shown in the Plate. This carving is found upon the same rock as the gigantic drawing of a man shown in Fig. 5, and not far from it.

Fig. 8.—I think this carving, which is on the same rock as Fig. 4, was intended to represent the sting-ray, as I have seen several similar drawings on different rocks, the animals being represented of various sizes,* ranging from 22ft. 1in. to less than 2ft. in length, the larger carvings being found on rocks where there was plenty of room, and the smaller where the space was more restricted.

Fig. 9.—This large and well-designed figure of a fish, perhaps intended for a shark,† is carved on a mass of Hawkesbury Sandstone, almost level with the surface of the ground, a few yards on the western side of the old road from Peat's Ferry to Sydney, about a quarter of a mile northerly from the group shown in

* See my paper on "Australian Rock Pictures," contributed to the Anthropological Society at Washington, published in *The American Anthropologist*, Vol. VIII, pp. 268-278, Plate II, Fig. 36, representing a sting-ray of colossal dimensions.

† Sharks were seen by Captain Wickham among the Depuch Island carvings.—*Loc cit.*, pp. 82-83.

Fig. 1. There is permanent water in gullies within half a mile. The total length from the snout to the tail is 17ft. 10in., and the measurement from point to point of the fins is 11ft. 10in. the width across the end of the tail being 4ft. 5in. There is a slightly sinuous line across the body behind the fins, and from it arise curved lines, meeting the outline of the fore part of the fish. Near the tail of the fish is a double outline, as if the artist had made a mistake and then corrected it. On the front side of the dorsal fin is an incised line 18in. long, a few inches within the outline, and almost parallel to it. The rock slopes easterly.

Fig. 10.—This curious carving, representing the lower half of a man, is situated on a large flat rock in a north-easterly continuation of the same outcrop of sandstone as that on which the last described figure is drawn, and is about from six to ten chains distant from it. The rock at this place has a gentle slope towards the south-east. From the toes to the top of the figure is 3ft. 7in., and the legs are in the attitude in which the natives appear when dancing. An incised line, nearly straight, reaches from the instep of one of the feet for a distance of 9ft. 2in., which may have been intended for a spear. Compare this with my description of Fig. 12 of this Plate.

Fig. 11.—This carving, which appears to be intended for an eel, is on the same mass of rock as Fig. 10. It is 5ft. 5in. long, and the width at the widest part is 10in. The length of the fins is 5in., and there are six incised lines across the body, similar to those appearing on the body of the fish shown in Fig. 8, Plate III., *Proc. Roy. Geo. Soc. Aust., Queensland Branch*, Vol. X.

Fig. 12.—This remarkable carving, representing a native wounded by a spear, is on the same flat rock as Figs. 10 and 11 of this Plate. The man is 5ft. 7in. tall and is roughly drawn. The head is very short, perhaps to indicate that it is hanging on the breast. The line which I assume to be a spear is 12ft. 9in. long, nearly a foot of which is within the outline of the man's shoulder, and its distal end is slightly bent. The man appears to be in the attitude of falling.

Fig. 13.—The last figure on the Plate, but by no means the least interesting, is evidently intended to represent a fish

caught on a line. Collins, in his *Account of the English Colony in New South Wales*, published in 1798, Vol. I., p. 557, speaks of the aborigines fishing with hooks made out of oyster shell, and fishing-lines made from the bark of a tree. The length of this fish is 4ft. 9in. There is a large ventral fin and two short incised lines projecting from the belly, probably intended for fins. There are five lines drawn across the body, and the two eyes are shown on the same side of the head, a mode of representing the eyes often observed in native pictures of different animals. The length of the string is 17ft. 5in.

The carving here represented is on the face of a perpendicular rock skirting the northern shore of Calabash Creek at its junction with Berowra Creek, and is distant about three-quarters of a mile in a south-westerly direction from Portion No. 6 of 40 acres, parish of Berowra, county of Cumberland.

Artesian Water Supply.

By W. G. Cox. C.E.

[Read at a Meeting of the Society, May 29, 1896.]

Having referred to his early experience in the United States of America in connection with artesian water supply, and to the views he expressed upon the subject in an article published in the *Brisbane Courier* in May, 1883, Mr. Cox said :—

The most recent examinations of the great water-bearing rocks fully confirm the position taken by the early pioneers of the movement in this country for an artesian water supply. They show that the sedimentary rocks were formed by the deposit in shallow seas of the disintegrated granite, both marine and terrestrial, of the ocean peaks and the ranges of the interior, the latter being brought down by heavy floods due to an enormously heavy rainfall; that those shallow seas separated the country into islands, and that the subsequent elevation of the land caused a recession of those seas and the formation of the compact island we now inhabit. The Cretaceous period during which these water-bearing rocks were formed, shows a gradual depression of the land accompanied by dislocation of the strata. The original deposit must have assumed a horizontal position, but borings into the formation over a long line of country now show that the rock lies at widely varying depths, although the surface of the ground is approximately level, giving a basin-like configuration, or a gradual fall from the outcrop towards the lowest level, that of the ocean.

These upheavals and depressions account for the varying depths of the water-bearing rocks below the surface, and have, in fact, by giving to the rocks a curvilinear form or a declination, admitted of the accumulation of water in them, which is subject to the hydraulic laws of artesian supplies. Broadly speaking, Australia has, in geological and geographical senses, passed through many phases—among them from a continent of high mountain ranges, producing enormous

rainfall and a complete system of rivers, to the condition produced by the decomposition and disintegration of the granite of the mountains and the subsequent gradual filling in of the valleys; the annihilation of the rivers and the formation of the great plains of the interior, with their underlying water-bearing formations. Upheavals and depressions have produced the wave-like configuration of the rocks; dislocations from a like cause have produced those extensive fissures observed in the older rocks, which openings have been filled in by the decomposed porous material of those rocks, and have become the receptacle for the fresh water which is frequently met with even in the auriferous regions of the country. If this broad view of the physical condition of the country be reliable, it is, I think, clear that every effort should be made to test all localities by actual boring, where the most superficial geological examinations show evidence of the existence of water-bearing rocks, or where, as in extreme cases of gold-bearing country—in which water is of exceptional value—water-bearing fissures have been formed.

We all know that Science is all embracing; that there is no principle at work, nor an atom existing in nature that escapes the keen insight, research and elaboration of the scientific mind of the present day. I may say that one of the ablest lectures I ever attended was one given in London some years ago by Professor Huxley, upon "Dust." This apparently simple subject —in its least palpable form an almost obscure one—was, by the research, elaboration, and eloquence of the lecturer, raised to a very high pinnacle in the estimation of those who were fortunate enough to hear it. It is not, therefore, surprising that such an important and now popular subject—for "nothing succeeds like success"—as artesian water supply should engage the attention of our savants. At the same time—and I say this with every respect for my present coadjutors in the matter—that too much scientific theorising upon the subject may tend, if freely indulged in, to antagonistic views being formed between the savants and result in a loss of confidence on the part of that portion of the public which is bent on a practical prosecution of it. Although it may be elaborated upon in a soundly scientific manner, the requisites for examining a district

for artesian water are comparatively simple, provided the examiner is possessed of a fair amount of theoretical and practical knowledge, based upon some information of the general geological nature of the district.

In travelling, to and whilst engaged in boring for water on, McFarlane's Station, 100 miles north of Wilcannia, Darling River, New South Wales, in 1879, after travelling through a very pronounced granite country, I pointed out the outcrop of sandstone and the great probability of obtaining artesian water on the station and in the district. Sub-artesian water was obtained by me in large quantities by boring through sandstone and shales. Subsequent recent deep-drilling has been highly successful in that district, proving that my forecast was a sound one. During sub-artesian boring operations for the Government, in the Cunnamulla district of Queensland, in 1883, after becoming familiar, by careful personal observations, with the geological features of that district, I strenuously advocated deep-drilling for true artesian water without success. Comparatively recent results of deep-drilling in that district have also fully confirmed the position taken by me. At Normanton, Gulf of Carpentaria, where I was engaged by the Railway Department in sub-artesian boring on the Croydon Railway, I also strongly advocated, with the Government and the Normanton Press, going deeper for artesian water, pointing out that the geological indications at Normanton and district—shown especially by the exposure of the Desert Sandstone—fully justified doing so, again without success. Artesian water, as is known, has recently been obtained in the town bore, Normanton. These are but a few of similiar experiences of the ill-success of a civil engineer's advocacy, especially in Queensland.

With the sound knowledge gained by me in the United States during a residence there, and constantly meeting as I did, during extended travelling in this country, palpable evidence of the existence of water-bearing rocks, with an almost absolute certainty of successful deep-drilling, my continued surprise and disappointment at the apathy evinced here upon the subject will be easily conceived. In this sense, it seems to me that the inference is unavoidable, viz., that the public were not to be moved except by the opinions and advocacy of Government

officials, and that the opinions and advocacy of civil engineers in private practice had no weight in the matter. This must now, however, be relegated to history. That which it now behoves us to do is to look to the future, and do all in our power, in the best possible manner and without delay, to further the inevitable great development of this artesian water supply.

There are ruling principles in searching for that supply which it is necessary to bear in mind. First, the source must be the rain falling on lands lying higher than the surface level of the bore, and soaking into the outcrop at the higher level. The inlet area of the water is that of the area of the outcrop. If the rock lies, with regard to the surface, at a low angle, the area of the outcrop will be greater than if it existed at a high angle, and will, therefore, absorb more water. If the outcrop be on sloping ground, with a catchment area above the outcrop, additional water will be intercepted, or if creeks run across the line of outcrop, or intercept it, additional water, in large quantities, will result. This water-bearing strata, varying as it does in porosity, it follows that some rocks imbibe water quicker than others, but most of them being highly porous and absorbent, the water passes slowly, but surely, by its own gravitation—following a ruling hydraulic law—to the lowest level attainable. The bed of the water-bearing rock must be of a compact water-tight nature, and so with the overlying rock. In that case, if the rock lies in a basin-like form, and a bore be made in the centre, we have an ideal artesian well, for the water lying in the lowest levels of the formation, upon being tapped by a bore—the surface of which is lower than the outcrop level—the water will rise with a *maximum* pressure above the surface at the bore to the height of the source of supply; or, if the water strata falls gradually from the outcrop away to the bed of the ocean—far below the site of the bore—artesian flowing water will be obtained, as the water, upon being tapped, will, under the great pressure from that lying in the strata above the level of the bore site, flow in the channel of least resistance—that of the bore itself. As to the main receiver and conductor of artesian water, that is, the Rolling Downs or Lower Cretaceous formation—since come under Mr. Jack's nomenclature of Blythesdale braystone—the auxilliary Carboniferous formation being alluded

to farther on—it is covered unconformably by the Upper Cretaceous or Desert Sandstone formation, which, according to the Queensland Government Geologist (Mr. Jack) occupies an area of at least 500,000 square miles. This has, however, been reduced by denudation to isolated tablelands. In this formation, although of a less absorbent nature than the braystones, water still passes freely, and it serves to maintain the supply in the more absorbent braystone long after the rivers and creeks have ceased to run.

The water-bearing beds vary greatly in texture, in compactness, and, therefore, in porosity. Limestones must be considered water-bearing, as they are much traversed by crevices at the surface, and rain water, acting as a solvent, has formed in them those huge caverns and underground conduits seen in the limestone caves, notably in New South Wales, Queensland, and West Australia ; success cannot, however, be relied upon in this formation, although where it has been channelled by exposure to surface action and afterwards covered by a clay deposit, success may be attained. Many good flowing wells have been obtained from it, but where the limestone beds be deeply buried below water-tight stata they have not, so far as general experience goes, proved productive. Speaking generally, the only reliable sources of artesian supplies are the sands, gravels, sandstones, conglomerates, and other rocks of loose granular texture ; in their deposition there was a great mixture of these rocks. Subsequent consolidation bound the fine sands into so compact, fine-grained a stone that it is almost impermeable to water. Others composed of the coarser materials are highly porous and free conductors of water. A remarkable instance of a highly porous, water-bearing rock is that of the Potsdam Sandstone of the Upper Mississippi Valley, with which I had much to do at one time. It is one of the oldest series of rocks, and yet one of the coarsest textured, contravening the general rule that consolidation depends upon the age of the formation.

The general definition of artesian water is that held between an impervious floor and roof, but cases occur—notably in the United States, in Dakota Territory—in which the whole of the basin above the impervious bed is composed of more or less pervious deposits, the pressure of the water in which, on a bore

being made through them and cased to the bottom or main channel, gives a true artesian flow. These basins are, however, of comparatively small area. In addition to the Cretaceous formation which has been treated so prominently in recent scientific writings, there is another system of rocks which have also been recently proved in this country to give artesian supplies. In a letter from me published in the *Brisbane Courier* last January, I gave my experience and opinions upon this subject as follows : " An experience gained in the United States, during a residence there of some six years, showed me clearly that it is not in one particular system of rocks alone that artesian water may be obtained ; this has been amply verified by American experience during the last thirty years ; the recently published 'Transactions of the Geological Survey of the United States' make no reference to the Cretaceous or any other particular system as being water-bearing more than another. 'As a matter of fact,' says the Transactions, 'the presence of artesian water depends upon physical laws which may be present in any geological formation, providing the required conditions to impound and force it to the surface are present.' A great number of the artesian wells of the United States are not in the Cretaceous, but in the Carboniferous formation ; this being the case, we have, in Australia, in all probability a much larger area of water-bearing rocks than that limited to the Cretaceous formation alone as implied in the Government Hydraulic Report."

A subsequent and recent Government report by Mr. Pittman, Government Geologist, New South Wales, on the Moree artesian bore, Narrabri and Moree road—on sending which to me Mr. Pittman said, " It will probably interest you as it refers to a portion of New South Wales not far from the borders of your colony "—shows that, after a careful examination of the district and the spoil heaps from various shafts and the bore itself, the rocks consisted of white and greyish sandstones, sandy shales, brownish clay and nodules of clay ironstone with thin seams of coal. In fragments of solid rock impressions were to be seen of fossil plants common to the Clarence River coal measures, in the Ipswich coal measures of Queensland, and in the Mesozoic coal measures of Victoria. The importance of this evidence is unquestionable, as it proves the existence of

large supplies of artesian water in triassic or jurassic rocks, whereas we had no previous definite knowledge that I am aware of in this country of the occurrence of artesian water in any other than the Cretaceous formation. The water from this Moree bore is of excellent quality, and the outflow is nearly three-quarters of a million gallons daily.

After having traversed the subject of artesian supplies from their initiation at higher levels—the nature of the water-bearing formations and their course—there now remains a very important consideration, that of their discharge into the bed of the ocean.

As this is just now a vexed question with some of those who have of late interested themselves in the subject of artesian water supply, and as it has a most important bearing on the question of the extent of evaporation going on on the surface of the catchment area of the water-bearing and conducting rocks, and as it concerns the quantity of the artesian supplies, I will endeavour to throw more light upon it, and I may say that if the views I hold become accepted, more confidence will be felt in providing money for searching for water in districts which have not hitherto had the benefit of the borer's drill.

One of the leading arguments against this ocean discharge, that of our president, Mr. J. P. Thomson, is substantially as follows—That Australia is formed with the eastern part high, and that it dips towards the centre more rapidly than the western half, which gradually and imperceptibly slopes inwards; that most of the inland basin is flat, the soil and upper stratum highly absorbent, while the lower portion of the bed in several places is not much, if indeed at all, above sea level. For this reason, and in view of the general physical structure of the continent as a whole, the theory of subterranean channels—through which it is believed that large volumes of rain water find their way to the sea—is held to be altogether erroneous. The argument also says that several leakages occur along some parts of the coast-line, oozing through the porous strata, or in the form of bubbling springs, such as may be met with along the shores of most of the Pacific Islands, but that the necessary evidence to sustain the theory that large volumes of fresh water are discharged into the ocean through subterranean channels is not at

present available. On higher levels, where the waters pass over or are collected in highly absorbent Cretaceous beds, some are retained from which the artesian supplies are probably derived; but even here a very large percentage is lost by evaporation, which, according to this argument, is of itself sufficient to compensate for the speedy drying-up of the shallow waterholes and river beds.

In this opinion we have the admission to begin with, that rainfall does discharge itself through water-bearing rocks into the ocean, places being mentioned where such takes place along various coast lines. In the absence of actual knowledge of the depth at which many of the water-bearing rocks lie, with regard to the surface of the sea at low water, and seeing that they may at their outlet lie down below that level, we have, I think, every reason to believe that the bulk of the enormous volume of water which enters the water-bearing rocks empties itself at the lowest level attainable, the bed of the ocean. This seems more obvious when it is taken into consideration (as I point out further on), that surface rivers running from the intake areas to the ocean do not exist, showing that the rain is absorbed by the water-bearing rocks which in discharging themselves into the ocean allow of subsequent absorption of further rainfall. The opinion that a very large percentage of the rainfall is lost by evaporation, which, it is said, "is of itself sufficient to account for the speedy drying-up of shallow waterholes and river beds" is, I am of opinion, as a civil engineer, altogether erroneous. I have carefully and deliberately watched the action of creek water in flood time in various parts of Queensland, especially in the Cretaceous country—the Tambo district—and have repeatedly seen the flood water come down a "banker" at one point in a creek, while at some ten miles or less below that point it was—within a few hours' time—easy to ford over in a few feet of water. I have also made a number of practical experiments in the absorption and evaporation of and from the surface after floods in various parts of Australia, and have invariably found that when once the rain water has entered the parched and highly absorbent ground—although evaporation goes on quicker at first from the saturated surface than it does from water itself. So soon as the sun asserts itself the surface as a rule becomes in a short time—a

few hours at most—caked or hardened, and that this hardening acts as a covering, or anti-evaporative, to the water below. I am quite convinced that evaporation to the extent the ardent imagination of some thinkers suggests to them is non-existent, and that this source of loss does not seriously affect the subterranean supply. When once the water has sunk into the porous, highly-absorbent ground it is safe. In stretches of country which in times of drought are dried up and waterless, but in flood times form creeks, lagoons, or swamps, a great portion of the flood water passes into the highly-absorbed ground long before a visible accumulation of water takes form on the surface, leaving a small portion only, that of the top or surface-water, liable to evaporation. The water, I am of opinion, certainly passes down and down by its own gravitation through an inconceivable number of minute interstices until it meets the resistance of a water-tight formation on which it either lies or travels to still lower depths. Most important evidence of the great depth of the Cretaceous formation is afforded by the temperature of the out-flowing water in the bores. It is generally accepted that the increased temperature of the water is due to the internal heat of the earth, and increases at the rate of 1 deg. Fah. for every 50ft. to 60ft. in depth. The soundest theory to my mind to account for the high temperature of the water is that of the dip of the water-bearing rocks to great depths between the outcrop and the bore. The highest temperature of which I have information is 197 deg. Fah. at the Dagworth Bore, Queensland. Taking the mean temperature of the air at 60 deg. Fah. and an increase in every 55ft. of 1 deg. Fah., we have 7,425ft. as the depth at which the water would derive its temperature of 195 deg., and it may be here remarked incidentally that if this theory be a sound one it affords confidence in making bores to much greater depths than those yet carried out. Taking another case, that of Toorak Bore, Flinders River, Queensland, where the surface levels in the vicinity are known and give about 600ft. above sea level, the temperature of the water is 140 deg. The bore is 1,600ft. in depth; the bottom of it is therefore 1,000ft. below sea level, and the base of the Cretaceous strata would be about 3,000ft. below sea level. Looking at the configuration of the

land above and below sea level, and that the land falls, in all probability, to great depths below the level of the coast-line, it is, I think, within reasonable belief that the enormous layers of water-bearing rocks have a termination and outlet at a point in the declivity far below the ocean level. Various localities have been assigned for these ocean outlets, viz., the Gulf of Carpentaria under the Dividing Range; at the head of the Flinders River in Queensland; the Great Australian Bight *via* Lake Eyre; under the present channel of the Darling-Murray to the Coorong coast. The measurements of the flow of water past a given point in the Darling River, New South Wales, made by the Government Astronomer, Mr. H. C. Russell, show that a small portion only of the catchment water is discharged by the River Darling, the bulk of it sinking into the ground. Taking these observations and results as a guide, it is easy to conceive a similar passage for our catchment area water. The bores now in operation in this colony cannot account for the passage of the enormous volume of water that passes into the outcrop of the water-bearing formations.

Without giving particulars of all the abundant evidences of the discharge of fresh water into the sea on the Australian coast one may, however, be mentioned in particular—much noted by South Australians—that in the neighbourhood of Streaky Bay, between Port Adelaide and Eucla, where an enormous volume of fresh water is seen to rush out at low tide from beneath the cliffs, preserving its freshness for some distance out to sea. This underground flow and escape of fresh water in the sea elsewhere in large quantities is mentioned in "Humbolt's Travels." In the Gulf of Mexico there is a submarine outflow a considerable distance from the South American coast which converts so large a space into a fresh-water lake that it is "inhabited by the fresh-water cretacea found in the Orinoco River;" also an abundant flow of fresh water in the Indian Ocean, 125 miles from Chittagong, and 100 miles from the coast of the Sunderbunds. My own opinion, that of a civil engineer, upon this question—expressed by me repeatedly in this country during a long course of years—is that the artesian water-bearing formations absorb an enormous quantity of water; that the evaporation of the rainfall, at their source of supply, is comparatively not worth

mentioning; that they consist of a series of basin-shaped undulations, and that they exist in all probability mostly in a continuous connected series from the outcrop, or highest or intake levels of the formation, and that the surplus water finally discharges itself by gravitation into the bed of the ocean, as I have often termed it, "unseen and unrecorded." Did these outlets not exist the water-bearing rocks, being fully charged, would admit of no more water, and the result would inevitably be a system of surface rivers which do not now exist, and a flooded state of the country at the intake areas and below, the extent of which one can scarcely form a conception.

There is another important consideration—the most important one to those carrying out boring operations—that of the permanence of supplies. Much has been written—I have written myself a great deal upon the subject; but, although this was not long ago, also a vexed and anxious question with those most directly concerned, the pastoralists, recent examinations of the subject by scientific men have removed much doubt upon it. This paper will not admit of space enough to go over the ground again in detail. It may suffice, however, to call to the mind's conception the great extent of the intake areas and feeders; the thousands of feet in thickness of the water-bearing rocks; that so long as the rain falls they will be replenished, and that the volume of the accumulated water is so enormous that the comparatively small draught upon it even by thousands of bores, would really amount, as Mr. Jack says, to a mere bagatelle.

In conclusion, I may be allowed, to repeat what I published in a pamphlet in Brisbane in 1883:—

"The artesian system of well-sinking has proved a great boon to the civilised world. After its established success through the wonderful results given by the wells of Paris some 40 years ago, it has been almost universally used. The formation of the crust of the earth and its general physical conditions being nearly the same in all countries admitted of this. The science of geology, initiated and developed in Europe, has been adopted with little alteration of its rules in Asia, America and Australia. The rain falls from the clouds on to the higher lands, percolates through the pervious strata, finds the lowest level possible in its passage to the ocean, into which the surplus

water discharges itself, forming on its way underground receptacles, the bed of which consists of the compact, impervious strata of the rocks. This artesian water may derive its source on higher lands many hundreds of miles distant, finding its way by underground conduits to the site of the boring. As in the wells of the Desert of Sahara, before mentioned, a sandy, parched and barren plain may cover at no great distance below a subterranean underflow of water ready at the will of the explorer to burst forth and change the aspect of the surface above from a condition of sterility and death to one of fertility and life!"

The Royal Geographical Society of Australasia, Queensland:

AN HISTORICAL REVIEW.

By Alexander Muir, J.P., *Vice-President.*

[Read at the Annual General Meeting of the Society, July 17, 1896.]

It may not be without profit to halt for a few minutes at this stage in the career of the Royal Geographical Society of Australasia, Queensland, for the purpose of a brief review. Experience teaches that periodical review is useful in many ways in an individual's life, and it may, therefore, be assumed to be correspondingly so in a society of individuals which at its initiation sets down for itself a definite purpose. It has accordingly been suggested by the Council that, as one of the very few foundation members remaining on the roll of the Society, I might undertake the duty. It is clear, from the title to this paper, that the writer does not intend to acquaint you of anything new or startling. The history of the Society in Queensland covers the short period of eleven years only. The first eleven years of a person's life is usually an uneventful period, and the parallel may not be inapt when applied to our youthful Society. It has during its brief existence pursued the even tenor of its quiet way, unobtrusively as becomes a scientific body, without, perhaps unfortunately, the fostering aid or public benefactions which have been extended to such institutions in some of the older colonies in the South. Unlike the southern societies, which have had their volumes of proceedings printed at their respective Government printing offices, in addition to receiving monetary assistance, the sole support of our Society has been, and continues to be, the voluntary contributions of its own members; and invariably these have been found sufficient for all its undertakings in the past, so that it may be said to have exhibited a vigorous childhood and to have betokened a not less vigorous manhood. Still, we

have the necessary ambition to do, or to assist in doing, great and perchance brilliant work, if we had the means. Forced, however, by necessity to occupy a humble sphere, the work performed has yet been of no mean order, and lives to the enlightenment of our fellow men, it is hoped, in the eleven volumes of our printed Proceedings and Transactions. To be sure, much more has been done than is therein detailed, but sufficient has been set down there to justify our existence, and even to point out a wider and grander field for enquiry and research in future.

The Royal Geographical Society of Australasia was first established, as might be expected, in New South Wales, as an offshoot, then, of the Royal Society, for the investigation of its own special department in enquiry. It was started in Sydney in 1883, and designated the "Geographical Society of Australasia," the parent organisation itself being entitled "The New South Wales Branch of the Geographical Society of Australasia," the intention being to establish provincial branches in all the Australian Colonies, the whole to be governed, according to the Constitution then framed and adopted, "by a General Council, composed of a President, a Vice-President for each associated province, one or more Hon. Secretaries, and one Hon. Treasurer and three Councillors for each associated province;" each provincial branch, including that of New South Wales, was to be governed by an Administrative Council, composed of a Vice-President, other Officers and Councillors. This original plan was, however, for various reasons, found impracticable and never carried out. Branches, so-called, were indeed established in several of the colonies, but these from the very first were not only separate, but really independent societies, having their own constitutions and rules, their own Presidents and Councils, electing their own members and otherwise controlling their own affairs independently of one another. In this way an anomaly was created, no doubt contrary to the intention of those who originally instituted the Sydney Branch of the Society and framed the Constitution. Up to the present the Royal Geographical Society of Australasia is composed of four so-called branches, but there is no stem, and this is where the anomaly comes in, for no branch by virtue of the original Constitution is entitled to style itself the *The Royal Geographical Society of Australasia.* Victoria followed with a branch, and, later on, Queensland and South Australia.

My duty, however, is to deal with the Royal Geographical Society of Australasia, Queensland. This was founded by the present President, Mr. J. P. Thomson, on the 10th July, 1885, at a meeting held in the Town Hall, Brisbane, under the presidency of Mr. W. Alcock Tully, B.A., then Surveyor-General of the colony. The late Sir Anthony Musgrave, Governor of Queensland, was its first patron, and remained so till the date of his lamented death. Sir Anthony was succeeded by Sir Henry Norman, who took the deepest interest in the welfare of the Society till his departure from the colony, and I am happy to state he, in turn, has been succeeded by His Excellency Lord Lamington, the present Governor of the colony, himself a distinguished geographer. The office of President has been successively and ably filled by the Hon. A. C. Gregory, an old Australian explorer—perhaps the very greatest surviving Australian explorer, of whom, and of whose achievements, let me add, we in Queensland are not a little proud; then by Dr. Waugh, Mr. W. H. Miskin, Sir S. W. Griffith, again by the Hon. A. C. Gregory, and for the past two years by the present occupant of the chair, Mr. J. P. Thomson, who, until his elevation to the office of President, occupied the position of Honorary Secretary from the inception of the Society. The history of a country is said to be indissolubly bound up with the history of its great men. Be that as it may, the history of this Society is indubitably interwoven with the energy and keenness of interest which have ever been shown in its welfare by its patrons and by its presidents, not the least energetic of whom has been Mr. J. P. Thomson, the present occupant of the presidential chair. Indeed, it were idle to deny him the full honour of being its sole Founder. In his brain sprang its conception; to his untiring energy does it owe its successful career; and upon him mainly do we rely for its continued progress.

Our President is an acknowledged authority in the sphere of geographical science, is the author of no fewer than 71 contributions to the scientific literature of the world, 23 of which have been read before this Society, and published in its Proceedings. His greatest effort, perhaps, is his standard work on "British New Guinea," issued in 1892, in London and

Australasia simultaneously.* Professionally, I know a good deal about how very favourably this work was received by the European and Australian Press, and respecting the avidity with which it was read by the better class of English-speaking people everywhere; indeed, so great was the interest shown in the work, that the London *Standard* devoted a leader to it.† On account of the contiguity of our own colony to New Guinea, and the interest which had been aroused by the occupation of that island, we naturally took a lively interest in the work of our President, which received most flattering notices from Sir Henry Norman, Sir William MacGregor, the members of the then Executive of Queensland, as well as from scientific societies and learned men throughout the world. To the zeal, accordingly, of our President, Mr. Thomson, whose mere drudgery in office can never be fully estimated, do we owe the inception and success of the Royal Geographical Society in Queensland, and on him, therefore, we cannot heap too much honour.

A tribute of praise is deservedly due to the present Honorary Secretary of the Society, Major A. J. Boyd, whose linguistic attainments and wide knowledge have proved him to be a most able lieutenant to the President in our operations. It is inconceivable that any other two gentlemen could be found to perform work so essentially congenial to their tastes, and on whose guidance the members of the Society could so safely and confidently rely. (*Applause*).

As already stated, the initiatory meetings of the Society were held in the Town Hall, Brisbane, by permission of His Worship the then Mayor. Subsequently, the favour was obtained from the Trustees of the Queensland Museum of holding the meetings of the Council and of the Society in the library room of that institution. This privilege was enjoyed by the Society for the first nine years of its life. It was there that some of the more important and interesting meetings were held, although the room was very small and inadequate for the purpose. Indeed, chairs and other seating accommodation had often to be borrowed on special occasions, and many shifts made to find

* *British New Guinea.* By J. P. Thomson, F.R.S.G.S., etc., with map, numerous illustrations, and appendix. Medium 8vo., pp. xxviii and 336. London: George Philip & Son; Brisbane: Alexander Muir & Morcom, 1892.

† The *Standard*, London, November 11, 1892.

room. The Society had the pleasure of receiving on several occasions many of its most distinguished supporters in the old meeting-room. Amongst these were included the late Sir Anthony Musgrave, Sir H. W. Norman, Sir William and Lady MacGregor, as well as many others. The first annual general meeting was held in the lecture hall of the School of Arts, Ann street, though there were several Council meetings and preliminary ones of the provisional Committee held previously in private offices in the city. At the end of nine years the Society gave up its old quarters in the Museum Library, as the contracted space therein available rendered more suitable premises necessary, and the present habitation was some two years ago happily secured, where our library, maps, etc., valued at about £600, are now placed and available to all members and friends of science. It is just as well to mention that no other privilege was enjoyed by the Society than that of simply holding the meetings in the library of the Museum, and, consequently, the Society was practically without home or habitation of any kind, save the private residence of its Founder, Mr. J. P. Thomson. For nine years Mr. Thomson had to do the whole secretarial and editorial work, and for six years of that period the duties of Treasurer, in his own private dwelling-house, where he had also to find accommodation for the large and increasing collection of books, maps, atlases, and other property belonging to the Society. These necessarily occupied a great deal of space in a private residence, and their custody, and that of manuscripts and other documents must, I am sure, have given Mr. Thomson and his family a great deal of anxiety. The labour involved from time to time in transporting to and from the city the whole contents of our library of maps and books, which, immediately after their removal from Mr. Thomson's residence to our present quarters, were insured for the sum of £500, must have been in itself a tedious and laborious task. This was rendered all the more so, when it is considered that the work had to be performed by the custodian's own hands, without any assistance or remuneration whatever. Even minute and cash books had to be handled in the same way, and at every meeting of the Council or of the Society they had to be carried backwards and forwards, with large parcels of books

from the Library (so called) to be laid on the table for inspection, and maps with which to illustrate papers to be read. Those who see our library room now, with table, chairs, iron boxes for the safe-keeping of papers and letters, with cupboard, and convenient shelves for the books, can have but an imperfect idea of the labour and anxiety of the past, and of the self-sacrifice of the Founder in his early struggles to establish our Society and to further the interests of geographical knowledge in this colony.

In 1886 an application by the Geographical Society of Australasia was transmitted to the Queen by the Right Hon. Lord Carrington, then Governor of N.S.W., seeking permission to assume the title of "Royal," and it was gratifying to the members of the Society when an intimation was received that Her Majesty had been pleased to accede to the application. Acting under the newly assumed title, the four branches of the Society co-operated in the preparation of an address which was presented to the Queen in the Jubilee year of Her Majesty's reign, and graciously accepted. This address, which bore the signatures of the Presidents of the branches, was beautifully executed and did credit to the Society.

In 1888 it occurred to our present President, Mr. J. P. Thomson, that some provision ought to be made by the Royal Geographical Society of Australasia to grant Diplomas of Fellowship to members, and to persons of scientific attainments who had rendered signal service to geographical science. With that object in view a resolution was submitted by him to the Annual General Meeting and passed unanimously. This was transmitted to the other branches of the Society and their co-operation in carrying it out invited. At the following Annual General Meeting an amended resolution was substituted in lieu of the previous one, and the branches again invited to take joint action in the matter; but, although our colleagues in Sydney were willing to co-operate, no satisfactory response was received from the others in Melbourne and Adelaide. Seeing that further delay in the matter was undesirable, it was decided by our Council, near the close of the present session, that Mr. Thomson should submit a final resolution at this meeting, and that the original action of this Society in affirming the desirableness of granting Diplomas of Fellowship should be consummated forthwith.

From the very inception of our Society it has been one of the aims of its Founder to encourage the study of geography in the schools of our colony and to advocate its claims to a place in the Higher Education. Referring to the minutes of our proceedings I find that Mr. Thomson had this subject so much at heart that some few years ago he communicated his views to the Council of the parent Royal Geographical Society in London, and urged that body to extend its system of annual school examinations to this colony, and to grant prizes and medals to successful students here, under similar conditions to those awarded by the Society to the same class in England. In reply, Mr. Thomson was invited to furnish information concerning the system of teaching geography in Queensland. This was obtained from the Department of Education in Brisbane, and from the Boys' Grammar School. It was considered by the Council in London, but was not regarded as satisfactory, and consequently nothing further was done in the matter. Again, when the University Commission was sitting in Brisbane, Mr. Thomson furnished the chairman with a copy of a memorial drawn up by the Royal Scottish Geographical Society for the Scottish University Commissioners, urging them to include geography in the *curricula* of these institutions. Shortly afterwards this Society, in common with other bodies, drew up a memorial which was presented to the Legislative Assembly of Queensland by one of our past presidents, Sir S. W. Griffith, then Premier, advocating the establishment of a university. Finally, our Council distributed, free, a special edition of J. P. Thomson's last presidential address to all the public and private schools of the colony, at the same time offering prizes for the best essays on the subject of the address.

Some few years ago Mr. Thomson, who was anxious to strengthen the position of our Society as much as possible, communicated with the Officers and Council of the Royal Scottish Geographical Society, of which influential body he is an Honorary Fellow, and upon his recommendation that Society was induced to grant our members the privilege of membership when in Great Britain, without the payment of further fees, a privilege it may be stated which we greatly appreciate. This was followed shortly afterwards by a similar act of courtesy on the part of the parent Society in London, whose cordial recognition of our work and position we desire to acknowledge.

In common with other cognate bodies our Society took part in the formation of the Australasian Association for the Advancement of Science, having sent a special Delegate (the present President, Mr. J. P. Thomson) to Sydney, to confer with other representatives on the matter. It was also represented at the fourth International Geographical Congress held in Paris in 1889, the late Mr. Justice Mein, who took a warm interest in our work, and Mr. John Fenwick, our present Hon. Treasurer, being the special delegates to the Congress. It was again represented by our Honorary Corresponding Member, Monsieur Ch. Gauthiot, at the Geographical Congress held at Genoa, to celebrate the fourth centenary of the discovery of America by Columbus, and at the recent sixth International Geographical Congress held in London, by our accomplished Honorary Corresponding Member, Dr. H. R. Mill, whose interesting report to our Society we publish in the forthcoming volume of our Proceedings.

It is true the means at our disposal have hitherto prevented us from entering upon the examination of unexplored regions, but we have, nevertheless, devoted a great deal of attention to the progress of explorations and discoveries in British New Guinea, to which the great amount of space devoted to these subjects in the volumes of our Proceedings and Transactions bears ample testimony.

A brief digest of the papers contributed to the Society and published in our volume of Proceedings and Transactions will, no doubt, be of interest.

SUMMARY OF PAPERS READ AND PUBLISHED.

In Volume I. we have, in the first place, an address on the "Objects of the Geographical Society," by Mr. J. P. Thomson; and the inaugural paper of the Hon. A. C. Gregory, delivered in 1885, dealing generally with exploration, and particularly with the results attained by Leichhardt and others in Australia. Then follows a paper by Mr. J. P. Thomson on "Macuata, the North-west coast of Vanua Levu, Fiji," containing an exhaustive description of its marine conditions, the adjacent islets, the harbours, rivers, the hot springs in the province, the cultivated and non-cultivated products and timber, as well as the white and native residents, and of the climate, the

whole being illustrated by a descriptive map. Mr. H. H. Romilly, a special commissioner to New Guinea in 1886, read a very instructive paper on that island, the chief feature of which was an excellent descriptive extract from his journal dated 1881, which is well worth perusal. A paper follows by Mr. T. B. Moore, on "Western Tasmania," a very partially explored and sparsely populated locality, dealing with its rivers, harbours, timber, scrubs, agricultural land, animals and minerals. The Hon. John Douglas—our own John Douglas—who was then also a special commissioner to British New Guinea, personally read a paper on "The Islands of Torres Straits." Needless to say that Mr. Douglas' paper, with accompanying map, forms quite an imposing feature of our first volume, as it had reference to islands till then but little known.

Not unnaturally, our recently acquired New Guinea possessions were then largely engrossing attention. Captain John Strachan accordingly furnishes us with an account of exploration in that country, with a map. He is followed by Mr. A. A. Hull on "Queensland as it was, and as it is;" and is succeeded by Captain J. M. Hennessy on "A few months' experience in New Guinea." Mr. W. H. Miskin brought our attention back again to our own colony in his paper on "The Upper South Johnstone River," which was then very imperfectly known, and which, as he says, "contains one vast, almost interminable expanse of dense tropical jungle, covering some hundreds of thousands of acres of probably the richest and most fertile soil in the world." Mr. Miskin describes the character of the soil, and the botany, and climate of the district, and has a section on zoology, of which, perhaps, no one here was a better exponent. Our first volume ends with a paper by Mr. W. L. Allardyce on "Rotumah," now a dependency of the Fijian group of islands.

It will be admitted, I think, that this is a very creditable effort for the first year of the Society's existence. But, for fear of wearying you, I cannot enter thus minutely into the succeeding years of our Transactions. Suffice it, therefore, to pick out the more prominent subjects dealt with.

In Volume II. there are Notes by Mr. E. G. Edelfelt on "New Guinea"; on the "Rewa River, Fiji," by Mr. J. P. Thomson, with an attractive map, and a historical paper by Mr. G. Woolnough on

the "British Possessions and Settlement in South-eastern New Guinea." Then follows, from Mr. J. P. Thomson, a paper explanatory of his action as a delegate from this Society to an intercolonial meeting held in Sydney in 1886 to form the Australasian Association for the Advancement of Science, and whose action was approvingly endorsed. An article by Captain J. Mackay on "Tucopia," a lonely little isle in the Western Pacific, of five miles in circumference, is succeeded by very interesting "Reminiscences of a Surveying Trip from Boulia to the South Australian Border," undertaken at the request of the Lands Department, by Mr. C. T. Bedford, in 1885. The late Mr. N. Bartley contributed a paper on "The Mountains of Queensland," and Mr. J. P. Thomson one on "A Preliminary Examination of a Hill (supposed to be subsiding) in the Redbank Plains District." The second volume also includes a paper by Captain W. C. Thomson, entitled "A History of the North-east Coast of Australia," and concludes with the address of the then President, the Hon. A. C. Gregory, who, after referring to Antarctic exploration, deals with the physical and auriferous discoveries in Australia, and with "Queensland's First Appearance in Proper Character."

Volume III. begins with "Some Remarks on the Cardwell District," by Mr. E. A. Leonard, and has a descriptive article on "The Discovery of the Pioneer River and the Early Settlement of Mackay, in 1860," by the discoverer, Captain John Mackay, and concludes in Part 1, with a paper by Mr. J. P. Thomson on "The Importance of the Teaching of Geography in the School." As will appear later on, Mr. Thomson emphasizes this duty in another paper, given last year. Volume III., Part 2, includes papers on "A Trip to the Hot Lake District, New Zealand," by Mr. P. W. Springall; one on a "Trip to the Western Part of the South Coast of British New Guinea," by Captain J. M. Hennessy, and two on "The Comet," and the "Occultation of the Planet Venus by the Moon," both being by Mr. J. P. Thomson, who, later on, contributed other articles on astronomical science; and closes with papers by Mr. D. Rannie on "New Ireland," in the Western Pacific, and by Mr. E. G. Edelfelt on "New Guinea."

Volume IV. opens with a paper, written and read by the Hon. John Douglas, our Government Resident at Thursday

Island, on a subject connected with geographical discovery in New Guinea, viz., "Sudest and the Louisiade Archipelago," is continued by one on the "Geographical Distribution of Plants," by Mr. W. Soutter, and concludes with the anniversary address of the then retiring President, Dr. Waugh, who therein gives a *résume* of some recent explorations.

Volume V. has an instructive paper by Mr. J. P. Thomson on "Sir William MacGregor's Ascent of Mount Victoria, and Exploration of the Owen Stanley Range, British New Guinea," from data largely supplied by Sir William himself, and is followed by pictorial illustrations thereof. Captain W. C. Thomson has a contribution on the "Gulf of Carpentaria." A paper on "The Torres Group" is given by Mr. D. Rannie; one on "The Application of Astronomy to Meteorology" by Mr. J. P. Thomson; and some "Notes made in the Fly River, New Guinea," by Captain J. M. Hennessy, of the Government steamer *Merrie England.* A very excellent paper is given in this volume also, by Mr. J. P. Thomson, on "The Brisbane River Floods," with special reference to those of 1890, and in which he points out how the rainfall may be remuneratively utilized in irrigation, and in which is also embodied a practical scheme for obviating the appalling injury and loss from which the capital of the colony is only now recovering. Mr. J. A. Robertson gives a contribution on the "Chatham Islands," which is accompanied by an excellent map, and the volume concludes with a paper by Mr. J. P. Thomson on "Sir William MacGregor's Upper Fly River Explorations in British New Guinea," and the anniversary address of the President, Mr. W. H. Miskin, which summarises the year's discovery.

Volume VI. begins with "Notes on the New Hebrides," by Mr. D. Rannie, who had spent some years in these islands. He is followed by Major A. J. Boyd, with a paper on "Ocean Currents," and by Mr. J. P. Thomson on his favourite subject, New Guinea, taking on this occasion "The North-east Coast of British New Guinea, and some of the adjacent Islands." This concludes Part 1. The second part opens with a report to the Council, by Mr. S. P. Smith, as the Society's representative to the Christchurch (N.Z.) meeting of the Australasian Association for the Advancement of Science. General Sir Henry Norman

communicates a letter on "The Exploration of the Antarctic Regions," and Mr. D. Rannie gives another paper, "Among the South-east Solomons." Sir S. W. Griffith, our present Chief Justice, who was then Prime Minister and our President for the year, concludes the volume with an appreciative address on "The Political Geography of Australia," in which he deals particularly with the unification of Australia, expressing the prophetic belief that the political union of Australia is absolutely inevitable, and that historical considerations and natural conditions point irresistibly to the conclusion that Australia will be no longer a mere geographical expression.

Volume VII., Part 1, contains "Some Remarks on the Island of Espíritu Santo, in the New Hebrides Group," by Capt. J. Williams; a paper on the "Customs and Superstitions of the New Guinea Natives," by Mr. E. G. Edelfelt; and one on "Universal Time Measurement," by Mr. J. P. Thomson. A very absorbing though brief account is here given of the reception tendered by this Society to the famous African explorer, Mr. H. M. Stanley, on the occasion of his visit to Brisbane. Some portions of it, indeed—notably that in which Mr. Stanley addresses Mr. Gregory—read like extracts from the account of the meeting of Stanley with Livingstone in the heart of the Dark Continent; to wit (after the two explorers had briefly complimented each other on their respective achievements, and their joy at meeting one another): "Mr. Stanley thereupon stepped up to our veteran explorer (Mr. Gregory) and warmly grasped his hand."

Volume VII., Part 2, opens with a *résume* "On the Hobart Meeting of the Australasian Association for the Advancement of Science," given by Sir Henry Norman, who was the sole delegate of this Society thereat. "A Brief Account of the Work and Aims of the Chief Weather Bureau, Brisbane," by Mr. Clement L. Wragge, its Founder, follows; and is succeeded by a discussion on "Weather Forecasting." A paper, which had been read at a meeting of the Manchester Geographical Society in 1891, on "Practical Suggestions to Travellers," by Mr. J. P. Thomson, appears in a revised form, and the volume concludes with the anniversary address by the Hon. A. C. Gregory, on a study of the characteristics, traditions and customs of the Aborigi-

nal Australians, whom he credits with an intelligence fully equal to that of the uneducated classes of Europeans. Referring in it to their ideas of a Supreme Being, Mr. Gregory narrates one of their myths with reference to the creation of the first blackfellow and gin, which is worth reproduction, viz.:—"When the Maker decided to form man, he took plastic clay and moulded first one leg, one arm, and half the head and body, then the other half was fashioned, and the two parts put together; but in closing the line of junction, there proved to be somewhat too much material, and part had to be removed by dexterous manipulation. Therefore, when the woman was to be made, the Maker determined to avoid the mistake of using too much material, and took a less quantity of clay, proceeding as in the case of the man; the quantity proved to be insufficient for a correct copy of His first work, and difficulty occurred in adjusting the two halves together; and thus the female was smaller, and did not quite correspond with her mate." A somewhat similar idea, at any rate with respect to the order in the creation of woman, if I may be allowed without flippancy to say so, seems to have been expressed by the poet Burns when he wrote, "His 'prentice hand He tried on man, and then He made the lasses, O."

Volume VIII. commences with an abstract of a paper by Mr. W. Soutter, entitled "The Speculative Cause of the Apparent Degeneration of the Australian Blacks." Major A. J. Boyd contributes his "Reminiscences of the Chincha Islands," situated off the west coast of Peru, being the recollections of a six months' sojourn in that neighbourhood in 1861. An abstract is also given of an address by Professor Geikie, on the "Geographical Development of Coast Lines." Mr. J. P. Thomson is the author of a paper on "The Melanesian Plateau," being notes on a contribution by Mr. Charles Hedley of the Australian Museum, Sydney. Captain W. C. Thomson deals with "The Stone Age in Australasia." The ever fertile Mr. Gregory contributes a paper on a subject which was then of painful interest, viz., "The Brisbane River Floods of 1893;" and Mr. S. W. Brooks, who had spent ten years or so in the South Seas, one on the "Grammarial and Glossarial Similarities of the Languages of New

Guinea and Fiji." Hon. A. C. Gregory, in his anniversary address, after further investigation, gives some "Notes on the Geographical Conditions of the Catchment Area of the Brisbane River," with special reference to the '93 floods and their origin. These notes are illustrated by a valuable map which is appended thereto; and the volume closes with a "Summary of the Geographical Work of Mr. J. P. Thomson, F.R.S.G.S.," published in the Transactions by reason of a special resolution of the Council of this Society, as a permanent record of the geographical work of its Founder. After recounting Mr. Thomson's travels, there follows a long list of publications up to the year 1892, of which he is the author. As before stated, this list has, since 1892, been extensively added to.

Volume IX. records the adoption of the hour-zone system of time reckoning by the Australian Governments, for railway and other public purposes—a system the adoption of which the Society had for a considerable time strongly advocated; and announces the return of the Antarctic whalers, *Balæna* and *Active*, well laden with sealskins and oil. Mr. J. P. Thomson furnishes "Notes on a Governor's Cruise in the West Indies in 1884," being an abridgment of a narrative written by General Sir Henry Norman. A very excellent description of "The Chillagoe Caves" in our own colony, is given by Mr. D. S. Thistlethwayte. The ever-prolific Founder of our Society has a paper on "Viti, Fiji," added to and revised, after having been read at the Adelaide meeting of the Australasian Association for the Advancement of Science, and which was published in the *Scottish Geographical Magazine* for March, 1894. An interesting contribution comes from the pen of Major A. J. Boyd, bearing the title of "A Remarkable Bottle Voyage," being a scientific explanation of the probable wanderings of a bottle for two years; and the volume closes with the anniversary address of the President for the time being, Dr. Waugh, on "Commercial Geography."

Volume X. opens with "A Survey of Recent Explorations in British New Guinea," by Mr. J. P. Thomson; is followed by an illustrated paper on "The Kamilaroi Class System of the Australian Aborigines," by Mr. R. H. Mathews; contains an article by Mr. C. W. De Vis on the word "Kangaroo;" and one from Mr. A. C. Gregory, on "The Construction of the Spirit Level in

its application to Instruments for the determination of geographical positions." Mr. J. R. Atkinson has a paper on "The Lighting of our Coast," and Mr. J. P. Thomson in his presidential address, closes the volume with a most exhaustive paper on "The Physical Geography of Australia," a paper which the Council of the Society thought so valuable, from an educational point of view, that a special edition of it was printed, and copies thereof transmitted to every public and private school in the colony.

Volume XI., which concludes the Transactions of the present year, contains a paper written and read by General Sir Henry Norman, our late Governor, on "Captain Cook and His First Voyage Round the World, 1768 to 1771; with special reference to his exploration of the Queensland Coast." Sir Henry always took a very lively interest in the proceedings of the Society, and no better evidence of this could be given than that he should, amidst his multitudinous farewell engagements, have spared time to address the Society as one of his last acts before his departure from the colony, and at the conclusion of which he was good enough to donate to it the volume dealing with the subject of his paper, together with a large and very useful map of Jamaica. Major A. J. Boyd contributes a paper on "Antarctic Exploration," in which he summarises the discoveries up to date, and refers to the importance of pursuing investigations in Antarctic regions, as well for commercial as meteorological purposes. Mr. D. R. McConnel adds a contribution on "The Blossoming of the Eucalyptus, and its Influence on the Product of the Honey Bee, from a Commercial Standpoint." Major Boyd again adds the "Narrative of Captain C. Pennefather's Exploration of the Coen, Archer, and Batavia Rivers, and of the Islands on the Western Coast of the Gulf of Carpentaria, 1880," and in the vicinity of which, although he affirms they are now "unvisited and uncivilized, except by the diggers and by the missionaries on the Batavia River," he predicts, before many years have elapsed, thriving homesteads, sugar plantations, and grazing farms will be established. An abstract of an address, delivered by our president, Mr. J. P. Thomson, follows, on "The Alleged Leakage of Artesian Water." The subject is admittedly controversial, as some have contended that there is an immense

outflow of artesian water into the ocean, while others hold that "the flow of the artesian water of the interior is towards the great salt lakes or marshes in South Australia." Mr. Thomson does not go "so far as to say that there is absolutlely no leakage into the sea" when conditions are favourable, but thinks such escape is comparatively insignificant, and accounts for the absorption of the rainfall as due mainly to evaporation. This subject is an engaging one, of which by research and enquiry we shall probably learn more later on. Mr. E. Tregear furnishes "Notes on an Article entitled 'On the word *Kangaroo*,'" given in the preceding volume by Mr. C. W. De Vis. The eleventh volume also contains the "Report of the Sixth International Geographical Congress, London, 1895," furnished by our own special delegate thereto—Professor H. R. Mill—at which, *inter alia*, H.R.H. the Duke of York, honorary president, "made special reference to the pressing importance of placing geography in its proper position in education, and very strongly advocated the renewal of Antarctic exploration." Mr. R. H. Mathews follows with a paper on "The Rock Pictures of the Australian Aborigines," with illustrative plates. This is succeeded by a paper on "Artesian Water Supply," by Mr. W. G. Cox, and the volume will end, as a matter of course, with the anniversary deliverance of our President, Mr. J. P. Thomson, the subject of which is, I understand, to be "Geography in Australasia."

This is, it must be confessed, but a very brief outline of the work which has been done, and of the record of investigation and research undertaken. As has been before stated, it is hoped we have, however, by it justified our existence as a Society. We have had an earnest wish to do much more than herein appears. Such as it is, however, our work has gone forth to the world in the hope that it may, in some small measure at least, assist towards the enlightenment of mankind on subjects of common interest.

GENERAL EXPLORATION.

It were well, in reviewing our position, historically, to glance rapidly at the outstanding features in exploration and geographical discovery generally during the last eleven years. In Africa there has been great activity within the various spheres

of influence in that country. Perhaps the most important movement was that which led to the despatch of the costly expedition under the command of H. M. Stanley for the rescue of Emin Pasha, Governor of the Equatorial Provinces. This expedition was successful. Of possibly equal importance was the successful ascent for the first time of the great African mountain Kilimanjaro, by Dr. Meyer, and later by Herr Otto F. Ehlers. In other parts of that country explorations have been conducted with energy by Teleki and Arnot north and south of the Equator; by Selous in Central South Africa; De Faucault in the Atlas Mountains; Messrs. Thorn and Harris in Morocco; Dr. Peters in the German Possessions; Theodore Bent among the ruins of Mashonaland, etc. Africa is a country in which the interests of the whole of Europe appear at present to be centred, and expeditions, both public and private, are frequently being sent out there. The Russians have displayed great activity in Central and Northern Asia, but it has been left to Captain Wiggins, an Englishman, to demonstrate the possibility of entering Central Siberia by a ship route, by way of the Arctic Sea and the navigation of the Obi and Yenesei rivers. Indeed, it is to British enterprise that we are indebted for our increased knowledge of the more remote parts of Asia, and especially to such distinguished travellers as our own Governor, Lord Lamington, whose extensive explorations in the almost unknown regions of Siam have been recognised by the whole civilized world to be of the greatest value. I have read with great interest Lord Lamington's description of his journey through a part of Siam which had not previously been at all visited, much less described, by any European. Should time permit His Excellency, amidst his many public engagements, we shall, it is needless to say, be grateful to hear from his own lips an account of his personal discoveries. I have no doubt that, during his residence in our midst, seized as he is with the importance of the work we are engaged in, His Excellency may find it convenient to grant us this favour. Science is also indebted to H. Warrington Smyth, whose exhaustive examination of the Upper Mekong Valley formed the subject of a valuable contribution to the Brisbane Session of the Australasian Association for the Advancement of Science. Nor must I forget to mention the interesting travels of Mrs. Bishop in her

important journeys through Lesser Thibet, Persia, and Kurdistan. The ice-bound regions of the Polar Seas have been forced to reveal to the enterprise of man and to the searching eye of Science many secrets long buried in darkness in that inhospitable part of the world; and it is due to the energy, enthusiasm, and hardihood of Dr. Nansen, who was the first to cross Greenland, and to the bold Lieutenant Peary, of the American Navy, and his plucky wife, that this has been brought about. The Arctic world is still being penetrated by Nansen, who hopes to reach the Pole, and recently by the Jackson-Harmsworth Expedition that lately returned therefrom. We are advised also by cable that Herr Andrèe, who is endeavouring to reach the North Pole by means of a balloon, is now at Spitzbergen. Turning to the Southern Hemisphere, we find that there has been great activity in the field of exploration and discovery during the eleven years of our Society's life. In the Antarctic regions there have been two voyages made in the interests of commerce and science, the first by the Dundee whalers, *Balæna* and *Active*, before referred to, and the last by a Norwegian whaler, having on board M. Borchgrevink, who was the first to land on the shores of the Antarctic Continent. In New Guinea there has probably been more work done in this department than in any other part of the world. Our Honorary Corresponding Member, Sir W. MacGregor, successfully ascended Mount Victoria, the highest peak of the Owen Stanley Range, and the highest known land in the British Possession there, after many unsuccessful attempts had been made by others to accomplish that feat. Besides, that model administrator and eminent explorer has examined almost the whole of the country, making important discoveries of rivers and other geographical features, which have been mapped out and published to the world. The Sydney and Melbourne branches of our Society have also taken part in the exploration of that country. The former sent out an expedition, and discovered the Strickland River; and the latter an expedition to explore Mount Obree and the region in its neigbourhood. The Germans, in their part of New Guinea, have also done good work in the field of exploration. Dr. Zöller ascended the Finisterre range of mountains, and discovered several new features between it and the Bismarck Ranges. In the Dutch Possession some activity

has also been shown, although a great deal there remains to be done, as that part is almost unexplored and unknown. In our own continent, there have been the Elder Scientific Expedition, the Teitkins Expedition, the Lindsay Expedition, the Horn Expedition, and, lately, that by Mr. Calvert, to explore the central regions of Australia. Most of these have been sent out under the auspices of the South Australian Branch of our Society, and have done good work in the interests of science and commerce.

CONCLUSION.

There is just one other thought I would like to express, and that is, that there is still a large area of our continent which has never yet been trodden by the foot of civilized man; an area possibly approaching in size to our own colony. This, it must be confessed, is not a creditable state of matters. Are there no more Leichhardts, no more Burkes and Wills, or McKinlays, or Gregorys? Or—which is more likely—are the Governments of the various colonies so consumed with the care of their own domestic affairs as to have lost the pristine patriotism which is the boast of their race. One cannot but re-echo the utterance of Mr. Thomson in his address delivered at the foundation meeting of this Society, eleven years ago, when he said: "the federation of nations may in various ways become complicated, but complete federation in geographical science is the one step necessary to insure progression and harmony in this field of labour." And again, referring to one of the objects aimed at by the Society, when he said "it was to circulate throughout the world a thorough knowledge of these great colonies, which are the choicest of Her Majesty's possessions." It is really much to be regretted that some systematic joint scheme has not been organised by the Governments of the several colonies for the thorough and continuous exploration of the unknown or imperfectly known portions of this vast continent, in order to aid in the ultimate development of its resources. It is, I think, a distinct blot on our Australian reputation for thoroughness, and for enterprise, that a standing intercolonial exploration scheme is not a feature of our policy. Why should the discovery of a nation's wealth, or if you like, a nation's poverty, be left to the spasmodic haphazard effort of private enterprise? If it is anybody's business to know all about this continent from end to

end, it is the business of everybody, and therefore of the Governments, the representative of everybody for the time being. It is, then, to be hoped that we shall soon, in a true federal and patriotic spirit, roll away this reproach, and that at least one of the results of the national sentiment now in course of development will be the consummation of a united scheme of geographical research within our own bounds at the nation's expense. Imagination, for aught we know, may be quite inadequate to depict the results of continuous and exhaustive exploratory efforts in the interior; and whether these results be commercially compensatory or otherwise, we should at all events actually know the intrinsic worth of our possessions; and, what is perhaps even better, exhibit a spirit in enterprise worthy of our national descent.

Before the reading of the paper the PRESIDENT said that at the request of the Council, Mr. Alexander Muir had very kindly consented to prepare an historical paper on the work of the Society since its inception. It was very necessary that this should be done while there was yet someone left to do it, and periodical reviews of the kind were of the greatest interest and value to the Society and to students of geographical literature. He (the President) should have liked to have devoted one of his Presidential addresses to the subject, but he was prevented from doing so, as he should necessarily have had to review his own work and actions as the Founder of the Society. No one else could be better qualified to deal with the subject than Mr. Muir, who had been associated with the Society since its foundation; indeed, he (the President) had consulted with Mr. Muir in the very earliest and preliminary stages before the Society was formed, at a time when the probabilities of establishing it were discussed. No one besides himself was more intimately acquainted with the history and work of the Society than Mr. Muir, and he was sure the members would listen to a very interesting and instructive paper.

After the reading of the paper the Hon. Secretary, Major A. J. Boyd, said that Mr. Muir had read a most excellent historic paper of the greatest value to the Society and to kindred institutions in all parts of the world, and he moved that it be printed *in extenso*.

Mr. JAMES ALLAN seconded the motion, saying that it was of great interest that such a complete and trustworthy historic account of the Society should be handed down to new, and even to old members.

The PRESIDENT heartily concurred in the remarks of Major Boyd and Mr. Allan. The paper was most accurate in every detail, and Mr. Muir deserved the cordial thanks of the Society for the labour he had performed on its behalf. Indeed, he had rendered a distinct service to the Society and to students of geographical literature.

The motion was carried unanimously.

Geography in Australasia: Anniversary Address to the Royal Geographical Society of Australasia, Brisbane.*

By the President, J. P. Thomson, F.R.S.G.S.;

Corresponding Member of the New York Academy of Sciences, etc.

For the second time I am called upon to deliver an address as President of the Royal Geographical Society of Australasia, Queensland. It may again be stated that I still hold to the opinion that an address of this kind should deal with some subject of local interest, however great the temptation may be to go outside the limits of our own country.

The position Geography now occupies, or should occupy, in Australasia appears to me to be a subject of very great importance to a Society of this kind, and indeed to all intelligent colonists. At the very inception of the Society, when addressing the first public meeting advocating its establishment in this colony, I endeavoured to point out the advantages of such an institution to the people, and the wide field we possess for the collation and dissemination of geographical knowledge among all classes. Since then I rejoice to find that we have had here amongst us one occupying the high and responsible position of Her Majesty's Representative who was most zealous in his efforts to encourage our labours and promote the interests of our cause. Sir Henry Norman's successor, I am happy to say, has taken upon himself the mantle of his predecessor and has also identified himself with our work; he has, indeed, already alluded to the necessity of prosecuting geographical research in this country, at the time we were honoured by His Excellency's presence at our first monthly meeting, after his arrival in Brisbane. Lord Lamington's timely remarks on that occasion were an earnest of the very deep interest that His Excellency evinces in the cause of geographical science, and justifies the distinguished position he has been called upon to fill in a young and great colony,

* Delivered at the Anniversary Meeting, July 22, 1896.

where the scope for geographical investigation is probably greater than in many older and more widely settled countries.

Although the term "Australasia" is one of very wide and comprehensive significance, there has been, I must confess with surprise, some doubt expressed, even amongst geographers in this country, concerning the wisdom of its general application in the sense it is now accepted in other parts of the world. Indeed, in more than one instance, authorities have been requested to define the limits of the region to which the general designation may be applied. This, I cannot help thinking, is a mere fanciful point for any one to raise. In the first instance it may be pointed out that the scope and aims of a geographical society are not circumscribed by any hard and fast geometrical lines to any particular part of the globe. Geography is essentially universal, even in its ordinary application, whether it be that of the air, the land or the sea, and it seems to me that if we understand that Australasia embraces Australia proper, New Guinea, New Zealand, Tasmania, and all other islands adjacent to our shores, no ambiguity can possibly arise in the mind of any one. The term is now so used by all the leading geographers in Europe and America, in preference to the more widely applied one of "Oceania," and no confusion seems likely to arise in consequence. It is in fact a Southern Asia, and nothing could be more appropriate, both to its extent and importance; while to the Anglo-Saxon race, by whom it was at first, and is even now being colonised, no other name could be more significant of the vastness of this part of the British Empire.

Within these Austral regions there are at present four principal geographical centres—Sydney, Melbourne, Adelaide, and our own capital city, Brisbane—centres wherein are established societies for the collation and diffusion of geographical knowledge. The birth of these date from 1883, when the first was established in Sydney, chiefly by the indomitable exertions of my late distinguished colleague, Mr. E. Marin La Meslée, whose untimely death and that of his wife some two or three years ago, by the capsizing of a yacht in Sydney Harbour, I greatly deplore. Mr. La Meslée, who was a valued member of the Société de Géographie Commerciale de Paris, was one of the very few enthusiasts in geography to be met with in this country, and

while he directed the affairs of the Society as Hon. Secretary, it distinguished itself by remarkable activity and the amount of useful work accomplished in the early stages of its existence. It was he who, more than anyone else, warmly advocated the exploration of British New Guinea, in the first published address to the newly-formed Geographical Society in New South Wales —an address of great lucidity, earnestness and clearness of diction. Melbourne shortly afterwards followed the example of the parent colony by establishing a federal organization about the middle of 1883. The initiatory work, and indeed most of the subsequent operations of that Society, have been directed mainly by my renowned colleague Baron Sir Ferd. von Mueller, and by Mr. A. C. Macdonald, with a few other willing workers. To the latter gentleman belongs the credit of having laboured enthusiastically as Hon. Secretary and Treasurer ever since the inception of the Society there.

The year 1885 marks a distinct epoch in the history of Australian Geography. In the beginning of it there was an elaborate and costly scientific expedition (equipped chiefly at the cost of three contributing colonies—New South Wales, Victoria, and Queensland)—despatched to British New Guinea, under the auspices of the Sydney branch of the Society. It was placed under the command of Captain H. C. Everill, assisted by a staff of specialists representing the principal departments of science. It is perhaps doubtful if the results of this enterprise were altogether commensurate with the outlay. Whilst this expedition was being sent out, arrangements were proceeding to establish two other federal societies—one in Adelaide, the other in our own city of Brisbane. Ours was instituted at a public meeting held at the Town Hall, Brisbane, on July 10, 1885, and the Adelaide one three months afterwards. Although we have probably heard less of our South Australian sister than of the others, it is pleasant to refer to the good local work it has done, especially in connection with the Elder Scientific Expedition to Central Australia, sent out under its auspices.

There is not much satisfaction in sounding our own trumpet, but I must confess, without the slightest inclination to do so, that, as the Founder of this Royal Geographical Society of Australasia in Queensland, I feel proud of the position we now occupy. We

have now entered upon our second decade, and during the whole eleven years of our existence, the monthly and other meetings have been held without the slightest break in their regularity, and I think we are as full of vitality and energy now as on the day of our birth. I prefer that our work should speak for itself, but at the same time it may not be out of place to quote an extract from an article in the Year Book of Australia for the information of those who may not have read it :—

". . . It" [The Royal Geographical Society of Australasia, Brisbane] "has made itself prominent chiefly by the copiousness and originality of its publications, in which great attention is given to exploration and discoveries in British New Guinea, and to the claims of geography to be recognised as a department of the Higher Education." This Society, it is well to point out, is distinguished from its sister organizations in the other colonies of Australia, in that it has received no money grants nor any material assistance whatever from the State, its position of vitality being sustained entirely by the contributions of its members. In Sydney and Melbourne our colleagues have enjoyed substantial money grants from Government, besides the very great assistance rendered to them, especially to the former and to the Adelaide Society, in having many of their journals printed at the expense of the State. I mention this as a special, and indeed remarkable, feature in our history, because it shows unmistakably and more clearly than anything else that the work of this Society has been carried on year after year without the slightest break or interruption of any kind, entirely by our own exertions. In my own case, I can conscientiously say that it has been a labour of love. The work has occupied the whole of my leisure time, at very great personal sacrifice, to an extent known only to my own family. Sundays, Saturdays and holidays have indeed been devoted to the work; there has been an ever increasing mental and physical labour, gratuitously performed, for which no material consideration could adequately recompense. Our own antipodean geographical societies occupy an entirely different position to those on the other side of the globe. There they are mostly managed by a large staff of paid officers, who enjoy the support of a powerful body of highly trained workers—men of means and leisure.

Here, even the purely clerical or mechanical work has to be performed by the honorary officers; and in our Queensland Society there has been no paid assistance whatever.

THE SCOPE OF GEOGRAPHY

Is the next subject to which I desire to draw attention. Regarded as one of the richest—one of the most essential departments of human knowledge — geography covers an enormously large field of investigation. It is a department with specialised subdivisions representing sections for the study of such highly important and practical subjects as the Land, the Sea, the Air—the Conditions of Animal and Vegetable Life — Man and his Environment — Historical Geography, Geographic Art (Cartography), the Geography of Commerce, Political Geography, and Astronomical Geography. To study these satisfactorily it is necessary to possess a deep and comprehensive knowledge of the world as a whole; an adequate conception of its place in the universe, the position it occupies in the economy of nature; the structural elements of the earth and their combination; a just conception of its motions, the laws by which they are regulated, as well as the natural course and order of these laws. If we are to accept the simple definition of the somewhat loosely applied term "science," as knowledge systematised, it must necessarily follow that the systematic study and investigation of geographical knowledge, in the widest acceptation of that term, will lie along clearly defined lines of scientific inquiry;—that, in point of fact, geography is one of the most fertile and stimulating departments of human knowledge, and one with long and widely expanding avenues for the application and free exercise of intellectual power. In its physical aspect it deals, broadly speaking, with the various configurations of land forms, their structure and changes, and the phenomena by which these changes are produced. In relation to the sea, geography, or oceanography, concerns itself with the configuration and contours of the submerged areas of the earth's crust, with ocean depths, currents, tides and the salinity of the waters. In the succeeding department the conditions of the air receive consideration, atmospheric phenomena are recorded, climatic conditions are investigated, and their influence on man and other forms of life studied. The

next subdivision appeals directly to human sympathy ; of all the sections of our subject this is perhaps the most vital, because it identifies itself with man and his environment ; the distribution of the race ; the influence of physical conditions and surface configurations of land forms in the production or modification of racial distinctions, peculiarities and mode of life ; man's place in the economy and realm of nature, and the distribution of other forms of animal and vegetable life. The historical division inquires into and records the history of exploration and discovery, the achievements of men distinguished by their labours in this department of human knowledge, geographical events in the life history of the race and of the world, and the history of cartography. The subject of geographic art is studied by cartographers or professional geographers who devote special attention to the art of map-making ; it is an interesting, important and skilled branch of the science, and one in which special training is required. Commercial, or economic geography appeals more directly, perhaps, to the practical phase of life than any of its preceding co-sections ; its ramifications are enormous and far-reaching, extending as they do to all parts of the earth inhabited by or accessible to man. It deals with the production, manufacture, exchange and consumption of human commodities ; the opening up of new markets ; the development of the natural and artificial resources and enterprise in new and foreign countries ; the extension of trade routes and the great commercial highways, besides foreign exchange, language, habits and customs, forms of government and other national considerations. The political section devotes itself to the consideration of domestic and foreign policies and relations, and to the permanence, position and delimitation of national and other boundaries, whether natural or artificial. It is an important branch, and one requiring a wider knowledge of the principles of geography, especially the physical aspect, and their closer study, than they usually receive. The astronomical division, as its name implies, associates itself with that branch of practical astronomy applied in the determination of positions on the earth's surface, when an accurate knowledge of the geographical co-ordinates of important localities is necessary for cartographic and other purposes. Within this highly important and essential branch

of geography are included such professional subjects of investigation as gravitation, terrestrial magnetism, geodesy and trigonometrical survey. Indeed, so closely are the preceding sections connected and interdependent upon one another, that the study of any one of them involves the study of all, and the necessity of this will become apparent when an adequate conception of the whole subject has been obtained. It is true that this department of knowledge offers many inducements for specialisation, and, where students are numerous and material abundant, there is probably an advantage in conducting investigations along special lines; but, although this method of procedure may be desirable under certain conditions, its ultimate effect must necessarily be to unduly circumscribe the field of inquiry and correspondingly narrow the mental capacity. This, I think, is undesirable in any branch of human knowledge, and especially in one so eminently calculated to broaden the intellectual power of man as that of geography.

To the merchant and to those engaged in the pursuit of trade there is no branch of the subject of more importance than that which deals with commerce, but it has been fully recognised by all leading geographers that commercial geography cannot be satisfactorily studied without a thorough knowledge of physical geography, which underlies it and forms the basis of all earth knowledge. Thus it will be understood that no matter how interesting and important any one of the collateral sections may appear, its study can never be wholly satisfactory unless the fundamental principles of the whole subject are duly comprehended.

THE UTILITY OF GEOGRAPHY.

I have so far endeavoured to briefly, and at the same time broadly, indicate the scope of geography. The next step will be to draw attention to its utility—its place in the economy of life. It would be difficult, if not indeed impossible, to point out any pursuit or phase of life entirely removed from the influence of geographical conditions. To the statesman concerned with the administration of the internal affairs of the country and in carrying out the foreign policy of government, an extended knowledge of the physical, commercial and industrial aspects at home and abroad is essential to the satisfactory performance of

duty, and in the interests of the people and of the country that knowledge should be sound and not merely superficial. Cases are by no means unknown in which important territorial rights have been lost to the nation through imperfect knowledge of their actual value for colonisation or strategetical purposes; and there are instances in which national boundary disputes could have been avoided altogether, and the military occupation of foreign countries rendered unnecessary, had the geographical conditions at first been more clearly understood.

To say that the success of commercial enterprise has depended in a very large degree upon extended geographical knowledge renders it also necessary to state that the extension of our knowledge of the geographical conditions of remote parts of the earth has been carried out in most cases along the channels of commerce, to whose facilities success is largely due. A wide knowledge of the natural and artificial resources of a country—its products, both raw and manufactured—its physical conditions and the facilities offered to trade; the accessibility of ports, the means of internal transport and the customs of the people, is essential to the successful pursuit of commercial enterprise in all its aspects, and it is to the storehouse of geography the merchant and trader must go for this information. Even in the extension and development of colonisation the same conditions hold good, for to the pastoralist it is advantageous to know the most favourable localities for the raising and breeding of stock as well as the position of handy markets and the best means of reaching them. The agriculturist, too, is laid under similar obligation, in that success will be greatly influenced by judicious selection of suitable soil and corresponding climate, and likewise the cheapest and readiest means of placing the produce for sale. In searching for mineral wealth in the rocks and soils the miner has to explore and minutely examine the physical structure of the country, and to note the occurrence and position of favourable surface indications, to enable him to continue the search with profit to himself and material advantage to the country. Here, too, will the proper application of the principles of geography in the prosecution of search largely conduce to success and open up wide avenues for the free exercise of human intelligence in this important branch of national industry. If from these

industrial considerations we extend our observations to the occurrence of great events that have determined the fate of nations on the field of battle, it will be found how largely the physical conditions of localities have been studied and their advantages utilised in directing military movements, and in this connection a thorough knowledge of physical geography is frequently essential to success. These remarks touch upon some of the more important pursuits of life in which the affairs of mankind are regulated and controlled by human intelligence, influenced by local environment, and stimulated by example. They show at once the utility of geography, the important place it occupies in the economy of life, and to what degree success will depend upon proper application of its principles.

From a mental or intellectual standpoint there is probably no aspect of the subject of geography more important to the race than its educational value, for the power it exercises in expanding and developing the youthful mind is enormous. In my view it is one of the most powerful fertilisers we have, an educator of paramount import, an agent of far-reaching discipline, and an instructor capable of imparting a deep and comprehensive knowledge of the earth and its place in nature, and man in his relation to other forms of life. It trains the mind and enables it to rightly comprehend terrestrial phenomena and their significance on animal and vegetable life. It accustoms the eye to observe and the mind to record with method and precision successive impressions, when properly taught. It aids and encourages study by its dramatic and realistic aspects, that appeal to human sympathies ; it stimulates the mental faculty, trains the power of perception, teaches order and method in the pursuits of life, cultivates the mind to conceive and the eye to view the more beautiful aspects of nature, and to comprehend natural law and order, while the novel phases of the study afford an opportunity for the evolution and development of original thought. In short, there is no pursuit in life to which the thorough study of this fascinating subject cannot be applied with advantage.

GEOGRAPHICAL EDUCATION.

This naturally leads up to the consideration of geographical education, or the attention bestowed upon the subject in the

educational institutions of Australasia. It is not merely the inclusion of it in the *curricula* of our schools and universities to which I now refer, but it is to the recognition of its value as one of the most important departments of human knowledge, and one that ought no longer to be neglected if we wish to qualify our young people for the higher and more useful pursuits of life. I shall probably be told that geography is one of the special subjects taught in our schools. So far as it goes this is no doubt substantially correct, but not the kind of geography as now understood by modern geographers. We call for a different method of teaching the subject, a fuller and more adequate recognition of its value as an educator, its position as a distinct science—the place it occupies as a special department of human knowledge, to be studied and treated according to scientific methods. Nothing short of this will give satisfaction. The method of teaching geography in Colonial, and indeed in most British schools is admitted by all the leading geographers, and even by many teachers themselves, to be altogether erroneous. Apart from the text-books and necessary appliances, the teaching is defective and inadequate, and the method of examination a mere test of memory. There is no reality and nothing dramatic introduced into the subject; there is nothing vitalising in the method, and the living aspects are not made to appeal to the sympathies of the youthful mind. Instead of being brought face to face with the natural and inspiring elements of geography, the mental impulses are repelled and cloyed by an array of lifeless names and relentless lines marshalled into order, or disorder, for memory torture. Teachers should recognise that most place-names are associated with history; that they possess silent life full of interest and instruction in their derivations, and that an unfolding of their hidden secrets will lighten and enliven instruction and impart to it a novel and life-like aspect for which youthful sympathies crave. Examinations should be conducted with the primary object of testing knowledge rather than memory, and each examination paper should deal with a single branch of the subject only and with not more than one country. It must not be supposed that the fault of the system lies altogether with teachers, many of whom are capable of doing better things.

The fact is that the text-books themselves are faulty, and until these are rendered more effective and adequate there is little hope of improvement in the method of instruction. Teachers themselves must learn to recognise that geography is something more than a mere committing to memory of place names, or the drawing of a sketch-map of some home or foreign country; they must soon realise that it is an important department of knowledge requiring thorough and systematic study, and that in the hands of a competent master it is an effective instrument capable of doing great things.

Viewed from a local standpoint, it is perhaps not too much to say that far too little attention is given to the geography of our own country. I do not mean to imply that information concerning the topography of Australia is so much wanted, or that it is altogether deficient, although our knowledge of it is far from being complete, but it is rather the necessity for the more thorough elucidation of its industrial capabilities that calls for these remarks. The investigation and the making known of available areas for agricultural and pastoral enterprise, as well as the more complete examination of our extensive mineral resources, demand attention. It is to this branch of geography I more particularly refer—to our great national industries, the extensive development of which would so materially affect the welfare of our young country. In the first place we require a far greater number of people: our rural population is puny in comparison to the enormous extent of territory. Facilities of transit are necessary to all available parts of the country, and the systematic preparation and wide dissemination of adequate and comprehensive literature, devoted to the thorough and popular treatment of these industries, require to be undertaken. A great deal indeed has been done in this connection—an enormous amount of work of far-reaching and permanent value—by our own Department of Public Lands and Survey, and by the Mines Department, under an administration of State officers characterised by signal ability in the discharge of responsible and onerous duties, in what has hitherto been a pioneering field of national enterprise. Still, these great branches of human industry have scarcely advanced beyond the initial stages, and the future will require close application and sustained effort in

the work of their development. To aid in this work there arises the necessity for special attention to commercial geography—to an investigation of the wide field that exists for the extension of economic or commercial enterprise in Australasia, especially that part now occupied by ourselves. In the manufacture of raw material and the export of dairy produce alone, there seems to me to be an enormous scope for the development of commerce, which would greatly stimulate our kindred industries and encourage territorial settlement.

Viewed from its political aspect the geography of Australia reveals a remarkable uniformity of land forms, where no natural barriers exist to prevent the unity of the people and of the colonies, into which the country is at present divided. The entire absence of lofty barrier ranges and of great rivers that occur in other countries and form natural national frontiers, point to the ultimate union of this great continent under one common Government, when freedom of trade will be enjoyed in all parts to the manifest advantage of the people and the good of the country.

A careful consideration of the preceding aspects of the subject under treatment suggests to me the necessity for a special department of geography under the control of the State, or, at least, one subsidised by it to an extent sufficient to enable an organization of the kind to render active and efficient aid in developing the industrial resources of our country. Such a department, effectively organized, might very properly be charged with the systematic examination of the undeveloped parts of our colony, and one of its chief functions would be to report authoritatively upon the facilities they offer for settlement, the establishment and expansion of enterprise, and the proper publication of these reports. It would place itself in touch with all kindred organizations everywhere; there would thus be an enormously increased circulation of the naturally abundant literature created by such a department, and its extensive ramifications would stimulate and encourage rapid and permanent settlement and colonisation over wide territorial areas. By these means the effective development of the many unproductive resources that now await the energy and enterprise of an intelligent and industrious people, to render them profitable to the State, would

be promoted. Much could be said in favour of this suggestion did it fall within the legitimate scope of this address, but these necessarily brief remarks are probably sufficient to show the utility of a State or quasi-State department of geography, the establishment of which, to my mind, would greatly contribute to our material welfare as a country, and ultimately to the prosperity of the nation. In any case, there should exist in every country an advisory board of geographers appointed by the State.

Considering the great and increasing activity displayed in the department of geography in the Northern Hemisphere during the past sixteen or twenty years, it must be admitted that the study of the subject is far behind in this part of the world; but on the other hand, if we make allowance for the extreme youth of Australia, as compared with Europe or even America, it will be conceded that it occupies a great deal of attention here, and is very well represented in the principal colonies and by the public Press. I am not inclined to deny that our operations are in a certain measure primitive, but when it is considered that the material is somewhat raw, it will, I think, be granted that geography is by no means a neglected science with us, and that viewed in the light of age, population and settlement, we are in point of fact, in this respect, far and away ahead of many of the older established countries of the world; and especially so in Queensland, although it is the youngest of our Australian Colonies. Even in ancient China and in British India no representative Society such as ours exists, notwithstanding our enormous interests in the latter country, and the vast field it possesses for geographical research. The same may be said of South Africa, where Cape Town, an old-established city, lies at the extreme end of one of the most interesting and important countries of the world to the geographer, and where, above all other places, one would naturally think that geography would find congenial and fruitful soil; whilst in Chili this department of knowledge seems to be wholly neglected.

In view of the backward state of these countries from a geographical standpoint, it seems to me that amongst the higher branches of human knowledge geography, after all, occupies a prominent place in the intellectual life of Australia. It must

be remembered, too, that the present generation labours under the disadvantages of the old school system, and that it is only from amongst those who are to follow that we must look for a clearer conception of the fundamental principles of geographical science, and the recognition of the necessity of its study in qualifying for an active and intelligent part in the higher pursuits of life. At present, activity in this department of knowledge is really limited, in our country, to the operations of the existing societies established for its promotion. Great progress, it is true, has of late years been made, and is even now being continued in the field of exploration and discovery in British New Guinea and Central Australia, mostly under the auspices of these societies, but, I must take this opportunity of pointing out that geography, as now understood, only really begins where exploration and discovery end, because it is with the examination, the elucidation and co-ordination of the results of these that geographers chiefly concern themselves.

GEOGRAPHICAL WORKERS.

This now brings me to a brief consideration of the labours of those who have mostly contributed to the advancement of geographical knowledge in this country. It is a somewhat difficult and withal delicate subject with which to deal, but one can scarcely speak of the work without reference to the workers, and usage in this case sanctions it. In this respect a difficulty presents itself at the very outset, insomuch as there are very few indeed amongst those who are identified with geographical work here who have not taken some part in Australian exploration and discovery, and it therefore seems to me that the geographer and explorer must in this instance be classified under a common category. In our own Queensland Society we can claim the proud privilege of including within our ranks the oldest living Australian explorer, one who has probably contributed more largely to geographical science in the field of exploration and discovery than any one else amongst us. The Hon. A. C. Gregory, of whom I now speak, being the last of an heroic band of pioneers who traversed the unknown regions of our continent in the interests of science and commerce at a time when the light of British civilisation had barely dawned upon the shores of this great country. In the midst of a high order of civilised life and prosperity we too readily lose sight of

those to whom the British Empire owes so much for its rapid extension, and we are apt to as quickly forget the noble and self-sacrificing deeds of our heroic men who went forth in the wild, inhospitable desert in the face of great danger.

In Western Australia, too, geography is laid under obligation to the labours of an eminent colonist, Sir John Forrest, who has rendered great service to the cause of exploration in that part of the country. In South Australia we are greatly indebted to the patriotic enterprise and munificence of Sir Thomas Elder, Mr. W. A. Horne, and lately to Mr. Albert Calvert, by whose liberality Central Australian exploration has been extended over wide areas of unexamined country. In our young Possession in New Guinea we need only refer to the brilliant achievements of our honorary corresponding member, Sir William MacGregor, to learn how largely scientific ability, human energy and enthusiasm, when wisely directed, can contribute to the civilisation and development of a wild and barbarous country, and the enormous power they exercise in the successful establishment of British law and order in the midst of cannibalism and savagery of the most formidable type. Again adverting to this country, we meet in the records of territorial exploration with the names of Ernest Giles and Ernest Favenc, the latter also well and favourably known in geographical literature, and the former for his extensive travels in Central Australia. Nor do these exhaust the list of South Australian workers, for we have recently been furnished with most valuable information concerning the physical and geological structure of the Northern Territory by the Government Geologist, Mr. H. Y. L. Brown, who has made an examination of that part of the country. In Victoria, the name of an eminent Botanist stands at the head of our Melbourne Branch, directing the labours of an energetic band of workers in the field of Australian Geography; indeed, the successful efforts of the Society there have been greatly influenced by the energy and enthusiasm of Baron Sir Ferd. von Mueller, and it was chiefly to the untiring zeal of that distinguished and erudite exponent of science that a renewal of our acquaintance with Antarctic regions has recently been brought about, and the further exploration of our own country promoted. In Queensland many valuable additions have for several years been made to physical geography by the extensive territorial travels of my esteemed friend Mr. R. L. Jack, in his clear elucidation

of the physical and geological structure, of widely separated and remote localities there, and more recently by his itinerary examination of the artesian water-bearing beds of the Western districts. These, although partaking more of the nature of exploration than of geographical research in the literal acceptation of that term, have contributed in a very large measure to the more complete knowledge of the physical conditions of our extensive territory, besides furnishing many valuable data by which we are all the more able to understand its geological structure, and by these means succeed in tracing the Lower Cretaceous beds that supply many parts of the dry western plains with artesian water. This department of investigation has, indeed, such an important bearing upon the future of the colony that it is scarcely possible to overestimate its value. Besides these names, to which necessarily brief reference has been made in the preceding remarks, there are other worthy, though probably less widely known, workers in the field of Australian geography who merit our best consideration. Time and space in what must necessarily be a limited address such as this will not however permit me to dwell longer upon this aspect of my subject, although it is with great reluctance that I must thus leave it imperfectly treated.

PAST AND PRESENT WORK.

Though much has been done in the past, a great deal awaits future investigation. We have made a good beginning, and that in itself is encouraging; more can scarcely be expected. Still, out of the darkness a ray of light has been evolved, and this gives hope that future effort will successfully dispel the gloom that overshadowed the past and still lingers over much of the present. In the field of Australian exploration and discovery there has been for some time a great deal of activity, especially in the remote central regions of the continent. This was largely, if not indeed wholly, due to the enterprising spirit of Sir Thomas Elder, who, some two years or so ago, equipped and maintained at his own cost a most complete scientific expedition, sent out under the auspices of our South Australian Branch of the Society. The results of this praiseworthy undertaking, although probably not fulfilling the most sanguine expectations of the honoured promoter, and of the scientific and

commercial world, were encouraging and full of interest, and no doubt the effort did a very great deal to stimulate subsequent investigation in the same field of research. This Elder expedition was succeeded by two others; the first sent out at the cost of Mr. William Austin Horn, and the latest, quite recently despatched, was fitted out by Mr. Albert Calvert. Of the results of the former, which were highly satisfactory from a scientific point of view, we have recently been furnished with very full information in the interesting paper read by Mr. Horn at a meeting of the Royal Colonial Institute, London, and published in its February (1896) Journal. I feel sure that I express the feelings of my fellow-workers here and in all parts of the world in wishing the latter expedition every success in its efforts to complete the exploration of the interior.

Besides the important work carried out by the Geological Survey Office of Queensland, to which I have alluded, there was produced in 1894 an excellent detail map showing the geological structure of Charters Towers Gold Field, examined by the Government Geologist and his assistants, and this has recently been succeeded by others, delineating the Palmer Gold Field, the Palmer District, and the Desert Sandstone Tableland between the Palmer and Mossman waters. Although of a kind especially valuable to geologists, it must be acknowledged that this class of work has an important bearing upon the physical geography of the country, and is such as to merit special notice in dealing with this subject.

In our neighbouring territory, in New Guinea, exploration is still being carried on with but little intermission, and important discoveries continue to be made by the able and accomplished Lieutenant-Governor, Sir William MacGregor. The examination of the seaboard regions has been further extended; and on the north-east coast fresh discoveries have been made and remote parts of the country further explored, new rivers have been navigated, and our knowledge of the whole Possession and of its people greatly increased.

At present, the principal work of our own geographical societies consists chiefly in collating and disseminating useful information concerning Australasia, but in addition to this praiseworthy and laudable object, in itself of immense advantage to the country, it seems to me that our sphere of usefulness

would be greatly enlarged and more widely felt were it possible for us to devote some of our future energy to the purely educational and practical aspect of the subject. We require to give a great deal of attention to what may be termed the domestic policy of the Society—to our home industries, and, above all, to the promotion and encouragement of the study of geography in our educational institutions. To my mind, the last of these is of the most vital importance to the young people of Australasia, and the necessity of the thorough and systematic study of the subject has always been urged by me since the inception of our Society. Indeed, so strongly has this impressed itself upon me that our Council, at my instigation, was induced last session to urge upon the sister branches of our federal body, in Sydney, Melbourne, and Adelaide, the necessity of an Intercolonial Geographical Conference, chiefly for its consideration. This proposal met with the warm support and hearty co-operation of our enlightened colleagues of the South Australian Council, but, although it is a cause for deep regret that the proposal was not responded to by the other federal branches, I still hope that the paramount urgency that exists for the discussion of the subject, and for the purpose of considering the general policy of our Australasian societies, will induce our colleagues in the Southern Colonies to feel that a sense of duty alone to our cause demands prompt and united action in the matter. It is not a thing of mere local concern, but a subject of wide and far-reaching influence that must necessarily affect the intellectual and material life of the people in a far larger degree than may appear at first sight. Although essentially cosmopolitan in our aims, the centre of our field of labour lies within this country, and it is inside, not outside, the limits of our own territory that our first and best energies ought to be applied. Once this fundamental principle is fully recognised, there will be no difficulty in formulating and carrying out a useful policy, and attention to this should no longer be delayed, if we are to justify our existence in even a moderate degree.

Here, at our very door, we have ample scope for the exercise of physical and mental energy in the noble cause of advancing human knowledge ; an interesting and fruitful field for action is spread out before us ; limited, for limited action ; vast, for grander deeds. Let us then continue our labours earnestly,

faithfully and cheerfully—expecting nothing, fearing nothing—but rejoicing in the strength and glory of our cause, with the bright torch of Reason and of Knowledge to guide us. Thus we shall be advancing our best interests, and while doing so we shall be doing good to others and bettering ourselves.

It now only remains for me to acknowledge the hearty and loyal support and co-operation of the officers and Council during the past session, in administering the affairs of the Society. To all I now accord my very hearty thanks, and especially so to our worthy Honorary Secretary, whose cheerful and constant attention to duty has rendered the performance of that pertaining to my office a pleasure and our relations cordial.

His Excellency Lord Lamington said: Never have I listened to an abler and more comprehensive address than that just delivered by our President. I have, indeed, never heard a more careful treatment of the subject of Geography than the one he has just put before us. It is impossible for me to review all the interesting matter, so completely collated, that the President has dilated upon, and most briefly then would I state that in my opinion he has elaborated and given us a complete exposition of what Geography means. He has gone into all the ramifications of Geography, into its divisions, subdivisions, branches and sections. Further than that he has traced the utilitarian effect that it has upon the training of any person, and beyond that he has shown what is the practical utility of all these branches of geography upon the conditions of the human race. And most briefly would I just touch upon this last important development of geographical teaching. The President referred to a supreme ignorance that often rests with those statesmen who have to guide all nations' interests. I would just like to point out, as illustrating his remark, the difficulties now besetting Great Britain owing to the Venezuelan boundary difficulties, and the disputes about the country across the Oxus in North-western India, and also other difficulties some six or seven years ago with Portugal, with reference to a certain settlement on the East Coast of Africa. I only mention these points as illustrating the practical effect geography in its very simple form has upon our destinies. When we come into its wider branches of course they enter upon the life of every one of us, and treat with the commercial and other interests that affect a nation's welfare. In regard to geography in its simple form, to my mind there is nothing more interesting than a map. I do not mind how well known the map is, there is always something fresh to learn, even if it is just comparing the bearings and distances of one place with another. Even in my own home I have a map, and if one chooses to look attentively at it there is something new and fresh to learn; and although I do not know anything of the art of map-making, still, in its simplest form, it is of supreme interest to anyone who cares to undertake it. I trust, therefore, that in the educational aspect many will

be encouraged to undertake the study of geography, even in its simplest forms, from the pleasure they will derive from the study. Australia is undoubtedly one of the few countries now in which discovery still awaits those who care to undertake the enterprise of exploration. As our President stated: Geography means something more than discovery; it only begins where exploration and discovery end. Still, there ought to be an encouragement for people to indulge in geographical research, as here they have it almost at their feet in its first and simplest form. When the President hinted that the Government ought to do more in this way, I confess he rather weakened his argument when he told us how good had been the work already accomplished by the different departments of the State, such as the Department of Lands and the Department of Mines, and the instances he quoted of the results of the labours of these departments show us how fully alive the Government is to work of this nature, and even if it had not been so, I would still discredit his original statement that the Government might do more in this direction. It might seem heresy for me to say so—I do not say it of this Government or any other Government—but I do not believe so much in Government as in private enterprise. Our experience in the past has proved that many Government expeditions, fitted out royally, have borne very barren results as compared with the enterprise and the rivalry and competition that have characterized such expeditions when undertaken by men who go out from mere love of the work that lies before them. At all events Queensland, the President has told us, is well to the front in all matters pertaining to Geography. In respect of this particular Society it is most satisfactory to learn how regular the meetings have been held, and how good and complete the publications have been. I think, also, this full room to-night shows what interest is taken by the public generally in Geography; and I think it is very remarkable that in this city of Brisbane, with its many other attractions, the science of Geography is on such a good footing; and with regard to his remark that the Society has no Government grant, I do not deplore that fact for a bit. I am sure that a Government grant very often has a contrary effect to what was intended or expected, and it often acts as a discouragement instead of being something to invigorate the work of a Society of this kind. I believe private enterprise in these matters—and every person taking a particular interest and not trusting to some supreme body who will dole out grants—will accomplish far more than any State-supported institution will. Of course the Geographical Society in London—it is so huge and rich that there is hardly any comparison—receives a Government grant, but still even their grant is a mere nothing compared with the total revenue of their Society, and I think that those who go from time to time and labour, as our President does, and as the Honorary Secretary on my right hand does, do far more than your State-supported or paid officials will; and it ought to be the greatest encouragement for all to think what time, trouble and expense of his leisure the President gives to the work of the Society. That ought to give encouragement for everybody to give over, however small, a portion of their leisure time to this subject and institution. When we think, as he

told us, the business of a Society like this is really very great and takes up the whole of his leisure hours, then we can see how his duties can be lightened by a number of people—those who are Members of the Society—showing their sympathy and interest in the work and attending the meetings, and it would be comparatively a small act on their part, as contrasted with what our President does. As for myself, I know I should like to attend the meetings more often, but there are other meetings which I have to attend, such as concerts and the like, and these will not allow me many free evenings. I shall be only too happy to come when I can, and I do earnestly hope that what I am certain our President would think was the best reward for his self-sacrificing conduct in regard to this Society, there will be an accession of members, and the consequent placing of the Society on a strong and efficient footing. His having given us so complete a paper, showing in every word what care, what trouble and pains he must have been at to collaborate such an able work, is sufficient evidence that it must be from the very heart that he carries on the work as President of the Society. It is, therefore, with the greatest pleasure that I now beg to move a vote of thanks to the President for his Annual Address, and also to move that it be printed. As I am going to be followed by a gentleman who is more worthy of your attention, I do not propose to say anything further. (*Applause*).

Hon. A. C. Gregory said : After the very interesting and able speech by His Excellency Lord Lamington, it seems there is very little left for me to say. Our President, Mr. Thomson, has favoured us with a most exhaustive and elaborate address, in which the subject of Geography, as one of the most important departments of science, has been treated with remarkable ability and lucidity. Geography has certainly been the cause of the occupation and colonization of Australia by a highly civilised and intelligent race of British people. Had it not been for scientific geography Australia would to this day have been the *habitat* of the blackfellow, and instead of there being a prosperous population of several millions, it would have been sparsely populated by a nomadic race. The same may, indeed, be said of other parts of the world that owe their civilisation and prosperity to this cause. In our own country there yet remains a great deal to be done in the field of exploration. Our neighbouring colony in New Guinea is probably one of the most interesting parts of the world for the explorer and professional geographer, and we are singularly fortunate in having such an accomplished geographer there as Sir William MacGregor to direct and control the affairs of that country. It is unnecessary for me to occupy the time of this meeting any longer, for it is quite impossible to review the many important points in the learned address which our President has just delivered. I will, therefore, conclude by stating that it affords me very great pleasure indeed to second the vote of thanks to the President for his able and instructive address, and I may further add that I very heartily endorse all that has been said about that gentleman by His Excellency the Governor. (*Applause*).

The motion was carried by acclamation, and the President returned thanks.

PROCEEDINGS

OF THE

Royal Geographical Society of Australasia,

BRISBANE.

ELEVENTH SESSION.

AUGUST 31, 1895.

The President, Mr. J. P. Thomson, F.R.S.G.S., etc., occupied the chair.

A large number of ladies and gentlemen were present.

The minutes of the previous Annual Meeting were read and confirmed.

Owing to an official dinner at Government House on the same evening, their Excellencies the Governor and Rear-Admiral Bridge, His Grace Archbishop Dunne, and some heads of departments were unable to be present. Letters of congratulation to the President on his election to a second term of office were read from the New South Wales and Victorian Branches of the Society. A congratulatory wire was also received from Baron Sir Ferd. von Mueller.

The following new members were elected:—Messrs. O. Radcliffe, J. A. Baxendell, G. Gross, W. Cameron, A A. Thomson, C. E. Whalley, J. H. Thompson, E. J. Matthews.

The Hon. Secretary presented the Tenth Volume of the Proceedings and Transactions of the Society, and drew attention to the invaluable work of Mr. J. P. Thomson in the "Schedules of Australian Rivers" accompanying his Annual Address. Copies of the volume were presented to several prominent visitors.

The Hon. Secretary, Major A. J. Boyd, read an important paper on "Antarctic Exploration," illustrated by sixty limelight views of Arctic and Australian scenery.

A vote of thanks to Mr. Pound for his manipulation of the magic lantern was carried by acclamation.

SEPTEMBER 28, 1895.

The President, Mr. J. P. Thomson, F.R.S.G.S., etc., in the chair.

The minutes of the meeting of August 31, were read and confirmed.

The following gentlemen were elected ordinary members:—Mr. W. J. Beattie; Captain H. P. V. Larsen, Q.A.V.; Major W. Cahill, Q.D.F.; Lieut.-Colonel H. C. Stanley, C.E.; Messrs. J. M. Harkness, A. S. Kennedy, Andrew Paterson, E. F. Hughes, Jas. Allan, and J. S. Wilson.

The Hon. Secretary laid on the table a number of valuable donations and exchanges from home and foreign societies.

Mr. D. R. McConnel read a highly interesting paper on "The Blossoming of the Eucalyptus, and its Influence on the Product of the Honey Bee, from a Commercial Standpoint."

OCTOBER 25, 1895.

The President, Mr. J. P. Thomson, F.R.S.G.S., etc., in the chair.

His Excellency the Governor, Sir Henry Wylie Norman, and a large audience were present.

The minutes of the meeting of September 28 were read and confirmed.

Elections: Messrs. P. Kenealy, J. W. Wheatcroft, W. G. Cox, C.E.

As this would be the last occasion on which His Excellency, owing to his departure for England, could be present, several valedictory letters were read. Amongst others, a telegram was read from Baron Sir Ferd. von Mueller, Melbourne, to the following effect: "Also my valedictory homage to His Excellency, after having continued in Australia his long and brilliant career." Also from Mr. A. A. Thomson, Sydney: "Kindly express my regret at being unable to attend meeting of Society. Also convey my desire to join with my brother members in wishing His Excellency Godspeed and future prosperity."

Contributions.

The Hon. Secretary announced the receipt of various contributions from societies in many parts.

Mr. A. Muir announced that the Council of the Society had resolved to transmit a copy of Mr. Thomson's Presidential Address to the various schools of the colony. The address dealt with the physical geography of Australia, and it was deemed that the information contained therein would stimulate the study of the subject. The Council had resolved to offer prizes to the scholars for the best essay thereon. He moved that the action of the Council be endorsed by the Society.

His Excellency the Governor, in seconding the motion, which was carried with acclamation, said he anticipated considerable advantage to the pupils of the various schools by the distribution of the address.

Captain Cook's Explorations.

His Excellency Sir H. W. Norman read a paper on "Captain Cook and his First Voyage Round the World, 1768 to 1771, with special reference to his exploration of the Queensland Coast."

Major Boyd stated that on the outbreak of the Palmer the *Leichhardt* went into the Endeavour River with one of Cook's old charts, and the captain found the soundings there laid down almost perfectly accurate.

The Hon. A. C. Gregory spoke of the extreme difficulties that Cook must have encountered on the dangerous coast he had travelled. Continued reference was made by Cook to scurvy grass used in maintaining the health of his crew. The grass grew along the whole of the coast in greater or less

quantities. The Governor had given them an admirable account of the voyage, and the thanks of the Society were due to him for his kindness, and he asked that they be accorded by acclamation.

Colonel DRURY, in seconding the vote of thanks, considered that they ought to thank the writer who had maligned Captain Cook as well, as it appeared that his comments had led up to their hearing the Governor read a most interesting paper.

Mr. MUIR supported the motion.

The PRESIDENT, in conveying the resolution carried by acclamation to His Excellency, said they had derived pleasure and satisfaction at hearing the paper read.

His EXCELLENCY, in responding, acknowledged the appreciation shown for the little trouble he had taken. Colonel Drury was right in his reference to the effect of the comment of the unknown writer in the Sydney Press. He (the Governor) thought the best way he could reply would be to write an account of Cook's explorations on the Queensland coast.

RESOLUTION OF THE SOCIETY.

The PRESIDENT moved that the thanks of the Society be accorded to the Governor for the eminent services he had rendered to the Society. They exceedingly regretted his departure.

Major BOYD, seconding the motion, said that His Excellency had rendered them many services, and he only hoped that his successor would do half what Sir Henry had done for them. The vote was carried with acclamation.

Sir HENRY NORMAN, in reply, said it had been a great pleasure to him to be a member of the Society. He had always taken a great interest in geography, and it had been a pleasure to attend the Society's meetings. His successor would most probably be a very active member. He had travelled in almost unknown parts of the world, had been to the back parts of Siam, and many other places. He hoped that his successor would have as much pleasure in belonging to the Society as he had had, and would be able to see as much of Queensland.

NOVEMBER 30, 1895.

The President, Mr. J. P. THOMSON, F.R.S.G.S., etc., in the chair.

The minutes of the meeting held on October 25, were read and confirmed.

A letter was read from His Excellency Sir Henry W. Norman, expressing his thanks for the farewell address presented to him on behalf of the Society, by the President and Hon. Secretary.

The following is the text of the Address:—

"THE ROYAL GEOGRAPHICAL SOCIETY OF AUSTRALASIA, QUEENSLAND.

"BRISBANE, *November 1st*, 1895.

"To HIS EXCELLENCY GENERAL SIR HENRY WYLIE NORMAN, G.C.B., G.C.M.G., C.I.E., F.R.G.S., ETC.,

Patron and Honorary Member of the Royal Geographical Society of Australasia, Brisbane, etc.

"SIR,

"On behalf of the Council and Members of the Royal Geographical Society of Australasia, Brisbane, we desire, before you leave the colony, to express to you our deep sense of the great benefits you have conferred upon the Society, not only by your distinguished patronage but also by the constant active interest you have taken in its work, and in furthering, by all means in your power, the objects it has in view.

"In expressing our deep regret at the loss we, in common with the community at large, will sustain, we are desirous of tendering to you our warmest thanks for your ever ready assistance, and the eminent services you have rendered to Geographical Science.

"By having cheerfully consented to represent us at Geographical Congresses in other colonies you have mainly contributed to build up the honourable position which our Society now holds in the world of science at home and abroad. And we feel that your absence will leave a void which it will be difficult, if not impossible, to fill.

"We wish also to express our indebtedness to our Honorary Member, Lady Norman, to Miss Norman and Miss Grace Norman for the interest they have taken in our work, by attending our meetings, and by their noble example, causing other ladies to join and take part in the proceedings of the Society.

"Your Excellency will be pleased to know that the Society is on a firm foundation. New members having lately been added to our roll in an unprecedented manner. It now remains for us to place the coping-stone on our work by being enabled to contribute to an Australian Antarctic Expedition, and we feel sure that your Excellency's co-operation will not be wanting to that end.

"In asking your acceptance of our Diploma of Honorary Membership we heartily wish your Excellency a pleasant voyage to the old country, where we feel you will continue to advance our interests in every possible way, and beg to assure you that Lady Norman, the ladies of your family and yourself will always be remembered with the warmest and most grateful feeling by every member of the Society.

"We are, Sir,

"Your most obedient servants,

"A. J. BOYD, *Hon. Sec.*"

"J. P. THOMSON, *President.*"

The PRESIDENT read another letter from His Excellency to Major Boyd, conveying to the latter his thanks for the able assistance afforded to him as Hon. Secretary of the Geographical Section, at the Intercolonial Science Congress held in Brisbane, in January, 1895, and expressing his pleasure at the able manner in which the secretarial work of the Royal Geographical Society in Queensland was being carried out by Major Boyd.

The PRESIDENT said he was much gratified at such a letter having been received from His Excellency. The Secretary's labours at the late meeting of the Science Association had been very great indeed—the Geographical Section having been the largest and the most popular. The real work of the Society devolved upon the Secretary, and Major Boyd's ardour and enthusiasm had the effect of creating the greatest spirit of harmony amongst the members.

Major BOYD then read a paper on the derivation of the word "kangaroo," by Mr. E. Tregear, Secretary of the Polynesian Society, in answer to a similar one by C. W. de Vis, M.A., Curator of the Brisbane Museum.

No discussion arose.

The HON. SECRETARY followed this with a paper by himself on "The Exploration of the Coen, Archer, and Batavia Rivers by Captain C. Pennefather in 1880."

JANUARY 3, 1896.

The President, Mr. J. P. THOMSON, F.R.S.G.S., etc., in the chair.

A Special Meeting of members was held for the purpose of the election as ordinary members of Captain C. Pennefather aud Messrs. N. E. Amos and D. N. McMorrison.

The meeting was adjourned until the 17th instant.

JANUARY 17, 1896.

The President, Mr. J. P. THOMSON, F.R.S.G.S., etc., in the chair.

The adjourned Special Meeting of members was held on this date.

The President exhibited the Clarke Medal of 1896, conferred by the Royal Society of New South Wales upon the Hon. A. C. Gregory, C.M.G., in recognition of his great services as an explorer, and as a contributor to Geographical and Geological Science.

The HON. SECRETARY read the report of Dr. Hugh Robert Mill, F.R.S.G.S., etc., delegate of the R.G.S.A. (Queensland), to the London International Geographical Congress, 1895.

The PRESIDENT eulogized Dr. Mill's work, and a vote of thanks, moved by himself, and seconded by Major BOYD, was carried unanimously.

Mr. THOMSON then delivered an address on "The Alleged Leakage of Artesian Water," in which he combated the propositions of Mr. W. G. Cox, C.E., on the subject.

APRIL 24, 1896.

The President, Mr. J. P. Thomson, F.R.S.G.S., etc., in the chair.

His Excellency Lord Lamington was present, and there was a large attendance of members and their friends.

The minutes of the two previous Special Meetings were read and confirmed.

The President stated that in compliance with a resolution passed at the last Council Meeting, he and the Hon. Secretary had waited upon His Excellency Lord Lamington at Government House, and had presented him, on behalf of the Society, with two bound volumes of the Society's publications, and with the following address:—

"THE ROYAL GEOGRAPHICAL SOCIETY OF AUSTRALASIA, QUEENSLAND.

"Brisbane, *April 6th*, 1896.

"To His Excellency The Right Honourable Lord Lamington, K.C.M.G., B.A., F.R.G.S., F.R.S.G.S., etc.

"Your Excellency,—In welcoming your Lordship on your arrival to assume the governorship of this colony, we, the President, Officers, and Council of the Royal Geographical Society of Australasia, Queensland, desire, on behalf of the Society, to express to you our gratification at the appointment to this high and responsible position of a gentleman, who, like yourself, possesses special claims to our esteem as a scientific explorer and traveller. We have followed with great interest your travels in Siam, and heartily endorse the statement of the President of the Royal Geographical Society, London, 1894, when he said that "not only the Royal Geographical Society, but the nation, owed a deep debt of gratitude to your Excellency for having so persistently and so ably kept before the Government and the public a matter of such great importance to England as the exploration of the Mekong." Your Excellency's distinguished predecessor, Sir Henry Wylie Norman, always evinced the most lively interest in the work of our Society; he became its Patron and an active member, not only in name, but he devoted considerable time to the preparation and reading of papers before the members and attending the monthly meetings. We trust that your Excellency will assist and countenance our efforts in the cause of geographical science, by conferring upon the Society the distinguished honour of your patronage, an honour which we shall the more appreciate from your Excellency's world-wide reputation as a geographer and explorer. We heartily welcome your Excellency and Lady Lamington to this colony, and trust that your residence amongst us may be productive of mutual pleasurable reminiscences hereafter."

[The address bore the signatures of the President and other officers of the Society and members of the Council.]

In presenting the address to Lord Lamington on that occasion, the President, Mr. J. P. Thomson said he felt much gratified at having conceded

to him the privilege of conveying to Lord Lamington the cordial welcome of his fellow-officers and esteemed colleagues of the Council of the Society. It was only fit and proper that they should hasten to welcome one of themselves—one who had not only distinguished himself in the field of exploration and discovery, but had gained renown by his valuable services in other respects to geographical science. He (the President) was also mindful of the fact that His Excellency was a highly-esteemed member of the Council of the parent Royal Geographical Society, London, and a co-honorary Fellow with himself of their national institution, The Royal Scottish Geographical Society. He could fully sympathise with his eminent colleague, Mr. Clements Markham, and the officers of the parent Society in London, when, taking a farewell of Lord and Lady Lamington on the eve of their departure for Queensland, he spoke with feelings of regret at the loss they and the Council would sustain by His Excellency's absence from their deliberations. He would find here an active, well-established Society, with a good roll of members and several energetic workers. They were affiliated with the great cognate societies in London, Edinburgh, and Manchester, and had branches in Sydney, Melbourne, and Adelaide. Of course, scientific societies in Queensland were very heavily handicapped. In older established communities there were usually a great number of men of leisure, who devoted time and means to scientific pursuits; but here we were not so fortunate, and the actual work of the societies generally devolved upon a very small number of enthusiasts, who devoted their leisure moments to it in promoting the interests of the higher branches of human knowledge. The good work of the Society was recognised by the entire scientific world and by all intelligent colonists. The Society had been honoured by the patronage of the most eminent persons, and some of the most distinguished authorities had contributed papers to it. During the course of its existence of some eleven or twelve years, it had published ten volumes of Proceedings and Transactions, and the Eleventh Volume was now in the Press. They had accumulated a most valuable library of some 5000 volumes, besides many splendid maps, charts, atlases, etc., and they distributed their publications to and received in exchange from all civilized parts of the world.

His Excellency in accepting the address and presentation on that occasion, said that he received it with great pleasure, and he noticed with much satisfaction that the Society was actuated by a spirit of reverence for the position he had the honour to hold as the representative of Her Majesty in this colony. He was referred to as a well-known traveller and explorer. Whatever he had been able to do—whatever notoriety he had obtained in that direction—were due to his earnest wish to promote in every way possible for him, the cause of geographical science. Of course, it was uphill work here—for, as Mr. Thomson had said, scientific men were few and far between in Queensland. But it redounded greatly to the honour of those enthusiastic gentlemen in all branches of science that they put their shoulders to the wheel and strove to elucidate the many problems of

geographic and kindred sciences in the colony. Here there was undoubtedly a magnificent field for investigation. In Queensland, geographers had a great advantage over those at home. The field lay at their very door, whilst the British Islands have been nearly exhausted, with the exception of some scientific questions on geographic distribution. He was glad to learn that the Society was in a prosperous and flourishing position, and doubtless it was a source of great satisfaction to the Australasian Society to know that the affairs of the Society of which he was a Fellow—the Royal Geographical Society in London—were in the hands of the present able and world-renowned President. He would have great pleasure in becoming Patron of the Society, and assured the deputation that nothing should be wanting on his part to advance its interests, as had been done by his predecessor, Sir Henry Norman. He thanked the deputation for the address of welcome and for the Volumes of the Proceedings which he would look over with great interest.

The Hon. A. C. Gregory gave a most excellent exposition of "The Alleged Leakage of Artesian Water," demonstrating his facts and theories by means of a map showing the areas of artesian water supply.

Mr. W. Jones read a communication from the Rev. W. Hey on "The Discovery of the Mission River, Cape York Peninsula," and the Hon. Secretary a paper by Mr. R. H. Mathews, of Parramatta, New South Wales, on "Aboriginal Rock Paintings," illustrated by reproductions of the original paintings.

MAY 29, 1896.

The President, Mr. J. P. Thomson, F.R.S.G.S., etc., in the chair.

The minutes of the previous Ordinary Meeting were read and confirmed.

Elections: Hon. Corresponding Member, The Hon. W. T. Harris, Ph.D., LL.D., Department of the Interior, Bureau of Education, Washington, U.S.A.; Ordinary Members—Messrs. A. Steuart, W. R. de Vaux, E. Gore-Jones, J. W. Sutton, Nugent Walsh, and A. E. Southwell Keeley.

The Hon. Secretary (Major A. J. Boyd) drew attention to a large number of books and pamphlets received as donations and exchanges since last meeting, bringing the library up to between four and five thousand publications. Particular mention was made of some volumes now received for the first time from the Swedish Society of Anthropology and Geography, Stockholm, entitled "Ymer." In connection with the publication Captain Larsen explained that "Ymer," according to old Scandinavian mythology, was the first living being produced from heat and cold. He was afterwards killed by Odin, Vile, and Vee, the sons of Bor; Odin, the principal god, formed the earth out of Ymer's body; his bones formed the rocks and mountains, his hair the plants and trees; his blood the waters, etc. Hence the connection between geography and the title of the work.

Australian Exploration.

A letter was read from the South Australian Branch of the Society, notifying the gratifying fact that an expedition had started, under the

leadership of Mr. L. Wells, to explore and map out the as yet unexplored portions of Australia. The requisite funds were supplied by Mr. Albert F. Calvert, and the expedition would be known as the Calvert Exploring Expedition. The President said the expedition was, although entirely South Australian, starting under the auspices of the Royal Geographical Society of Australasia, and as a body it was most gratifying that such noble enterprise existed in geographical circles in South Australia. He moved, "That the Secretary send a congratulatory telegram to the South Australian Branch." This was decided upon. The Hon. A. C. Gregory, Captain Owen, the President, and Major Boyd discussed briefly the probable route which the party would take.

The Hon. A. C. Gregory read a paper, based on notes supplied by Mr. H. Burkitt, on "The Site of Cook's Monument at Cooktown." In the paper it was pointed out that Cook's monument had not been erected upon the site originally occupied by the *Endeavour* at the time that vessel was beached by Capt. Cook at the mouth of the Endeavour River for repairs.

The President spoke of the so-called discovery of the "Mission River," and showed that Capt. Flinders had long ago discovered this and other rivers in Cape York Peninsula.

Mr. W. G. Cox read a paper on "Artesian Water Supply."

JUNE 18, 1896.

The President, Mr. J. P. Thomson, F.R.S.G.S., etc., in the chair.

The Prize Essay by Miss Mildred Finlay on "The Physical Geography of Australia," based on the subject of the President's Annual Address, 1895, which had been sent to every school in the colony to the number of over a thousand, was read by Mrs. A. J. Boyd, and was considered a most meritorious production. The Hon. Secretary read a paper by Mr. R. H. Mathews on "The Initiation Ceremonies of the Aborigines of the Upper Lachlan," of which the following is an abstract:—

The paper opens with a description of the main camp and "Burbung" ground. (*Burbung* means a large ring, twenty-five yards in diameter.) The preparation of the ground is next described. About a-quarter of a mile from this circle another and smaller circle, called a "goombo," is cleared, having no surrounding wall like the first, but enclosing four heaps of earth about eighteen inches high. On both sides of the pathway leading from the burbung to the goombo numerous devices and figures are formed on the ground. These are called "yowan." Not far from the goombo is an image Dhurramoolan, of clay, about 5 feet high, with only one leg. The gathering of the tribes is next described. This is carried out by means of a message-stick passed from tribe to tribe. As the contingents arrive they camp a the distance of a day's journey, or less, from the burbung camp, and the boys to be initiated are painted red all over. The arrival at the main camp is heralded by shouts and the sound of the "bull roarer." The women

remain at some distance with the effects left behind by the men. The men enter the ring, and the mothers of the novices halt a short distance from it. Each probationer carries a green bough, and each contingent follows the same procedure. As soon as all have arrived, four of the old men, skilled in magic, get on top of the heaps of earth and perform certain incantations, the rest sitting in front as spectators. The boys initiated at the last burbung are now privileged to look at the image of Dhurramoolan. At night all dance a corrobboree. Corrobborees and other performances are enacted daily, and in the early part of the day the men and youths go out hunting. About two or three hours before sunset the men of the local tribe proceed to the ring with a bush in each hand. The men of the other tribes join them at a given signal, each tribe, however, keeping separate. They march round the ring and then file out, stopping at each figure on the ground, the novices being invited to take particular notice of all that is done. At the daily meetings discussions are held as to the most suitable place for a camp when the boys are removed to the bush. Every novice has a guardian assigned to him. These guardians do not act openly, as the women are not allowed to know that they take an active part in the proceedings; but they get some of their brothers to act as assistants, until the women are covered up. They invest the novice with a girdle, under which are inserted four tails, one in front, one behind, and one at either side, and a net band is placed round the forehead. The sisters of the novices now paint them red, and then they are led into the ring and seated on some bark close to the embankment. They sit with heads bowed down. The mothers are now brought up, and each sits behind her son, holding the tail attached to the left side of his girdle. All the women and children are then ordered to lie down, and a number of men cover them with rugs and bushes, and then watch over them with spears. When all is ready, the head men sound the bull-roarers, and several men come along carrying in the hand a tapering piece of bark called "munga." They enter the ring and hit the ground heavily with the bark and then withdraw. All the other men shout, and the guardians seize the novices and lead them out of the circle. The women are led to believe that the terrific uproar is caused by the trampling of Dhurramoolan, when taking the boys away. Fire-sticks are thrown about near the women to impress them with the prejudice Dhurramoolan has against womankind. As soon as the novices are out of sight, the women are uncovered and allowed to rise, and then they commence a great lamentation. Then they depart for a new camp. As soon as the novices have got a little way beyond the goombo they are placed, lying down on their sides, and a rug is thrown over each of them, and they are left thus for about half-an-hour. Every man of the *kooringal* (strong men) now paints himself with charcoal and grease, and all sit down near the boys. These are then helped to their feet, and the rug is adjusted over the head in such a way that a small opening is left to allow the boy to see the ground at his feet. The guardians next conduct the boys to a camp near a waterhole, and there place them on the ground, and then prepare a corrobborree ground. That night the boys are brought out of the camp

and are passed across it from one dark side to the other, when they are led back to their camp. Next day the paint is removed from the bodies of the novices, and as they are not allowed to speak, they have all their wants attended to on making signals to their guardians. At their meals the food supplied to the novices is deprived of bones and sinews. Some time after dark the novices are brought to one side of the camp fire, and several of the kooringal men climb the trees and imitate the sounds of opossums. Then they descend and run on their hands and feet past the camp fire. This finishes the performance, and the boys are taken back to camp. On the next night the kooringal pretend to quarrel, and a tremendous row ensues, to intimidate the boys, who are lying down covered up with rugs. Then the kooringal gather round the boys and sing Dhurramoolan's song to them. Next day the kooringal play "Dhoondhoo," or black swans, and then go out hunting. On the following morning the old men awaken the whole camp, and then it is broken up into small segments, and each segment goes off and forms a new camp. After the morning meal the novices are placed standing in a row with rugs over their heads. Then the kooringal men begin hitting the ground with bark, and at the same time bull-roarers (mudgeegang) are sounded by two men, and the novices are allowed to look at the scene before them. The men then rise and advance to the boys, boomerang in hand. and throw them over the boys' heads. The blankets are then removed from the novices' heads, and the kooringal threaten them with death if they ever reveal what they have been shown to the women or to the uninitiated. Then they all go hunting together, but the novices are not allowed to look behind or on either side of them. When getting in sight of No. 1 camp, each boy is given a bush, which he puts down and sits on it. Then a yard, called "thurrawanga," is built for the purpose of receiving the novices on their return in the evening. Then, after several other ceremonies, the lads are carried on the men's shoulders into the enclosure and seated on a platform. Each mother then comes forward and squirts clay from her mouth into the novice's face, and hands a spear to the guardian, who gives it to the novice. Next day, and for a few following days, the novices are sent into the bush to get their own living, and then return to the main camp. Each boy receives a dilly-bag and all are thoroughly well smoked, and the mothers place food in the dilly-bag. The boys are then brought into the single men's camp, and the ceremonies come to an end.

ANNUAL GENERAL MEETING.

JULY 17, 1896.

The President, Mr. J. P. Thomson, F.R.S,G.S., etc., in the chair.

There was a good attendance of members and visitors, many ladies honouring the meeting with their presence.

The President brought forward the decision of the Society to grant

Fellowships to deserving members of the Society. He explained the action of the Council in this matter. Some years ago it had been decided to grant fellowships; but for various reasons the matter had been held in abeyance until the present date. There would be two kinds of fellowships awarded, one the honorary fellowship, the other ordinary fellowship. The first would be awarded only to those who had distinguished themselves by special service to geographical science, or to the Queensland Society. He tabled the following resolution, which was unanimously approved:—"That the Council may confer the Diploma of Fellowship upon such eminent persons as have rendered valuable services to geographical science; on persons of distinguished scientific attainments; on those who have promoted the objects of the Society; and on Honorary and Honorary Corresponding Members of the Society, without the payment of diploma fees. On Ordinary Members, on payment of a nominal Diploma fee, subject to the following conditions, namely:—(*a*) Upon written application; those who have compounded for life membership and are deemed worthy of the distinction by the Council. (*b*) Upon written application; those who are not in arrears with their annual subscriptions, and are, upon the recommendation of the Council, approved by the Society at an ordinary monthly meeting. Of the honorary class the number of Fellows shall not exceed ten. Each Diploma, after being approved by the Council, shall be signed by the President, and by the Hon. Secretary of the Society. Members who receive the diplomas shall have the privilege of designating themselves 'Fellows' of the Society, and may use the initials F.R.G.S.A. (Q.) after their names as long as they continue to be members of the Society." He proposed the names of three gentlemen for Honorary Fellowship. These were—first, Sir William MacGregor, K.C.M.G., D.Sc., etc., the Hon. A. C. Gregory, C.M.G., etc., and Major A. J. Boyd, Q.A. He explained the claims of these gentlemen to the honourable distinction of being the first on whom the honorary fellowship would be conferred. Ordinary fellowships, he said, would be conferred on members whose claims to such distinction could be admitted by the Council on payment of a small diploma fee.

The nominations were received with much applause, and the President said that at the conversazione to be held on Wednesday, the 22nd instant, at which His Excellency the Governor would be present, the fellowships would be conferred upon the honoured recipients.

The President then called upon the Hon. Treasurer, Mr. John Fenwick, to read his financial statement.

Major Boyd then read the following Report of the Council for 1895-6:—

Report of Council, Session 1895-96.

To the Members of the Royal Geographical Society of Australasia, Queensland.

Ladies and Gentlemen,

In accordance with the customary annual practice of past years, the Council has the honour to submit for your information the following

Annual Report of the work of the Society during the past Session, the eleventh since its foundation in 1885.

That Session came to a close on June 30th, 1896, and the Council begs to draw your attention to the exceptional success of its operations during the year.

Membership.—At the termination of the Session the number of members, exclusive of those who have left the colony, or who, for various reasons, have ceased to be members, was as follows :—Ordinary Members, 106; Life Members, 14; Honorary Members, 5; Honorary Corresponding Members, 10; total, 135. The list of ordinary members has also been reduced by three deaths.

Colonel E. R. Drury was one of the Foundation Members of the Society and although during his lifetime he was unable to take an active part in the working of the Society, yet he always evinced great interest in its progress.

Mr. W. Taylor, of Cleveland, one of the Life Members of the Society and an ardent supporter of it, has also passed away.

We have also to record the death of Mr. A. W. Bucknell, of Moree, N.S.W., a very old and respected colonist of that colony, and one who warmly sympathised with the objects of the Society. The Council deeply regrets the loss of these gentlemen from the roll of members.

During the last nine months of the Session 33 new members have been added to the roll, numbering amongst them several well-known scientists.

By the departure of the late Governor, Major-General Sir Henry Wylie Norman, G.C.M.G., C.I.E., etc., Patron of the Society, a severe loss was experienced, as Sir Henry was an enthusiastic member and contributed in a very large degree to the literature of the Society by his highly interesting papers on various geographical subjects, the results of his personal experience and travels. The Council again desires to place on record their indebtedness to Sir Henry Norman for his indefatigable exertions in the Society's interests, and for the services he rendered in representing it at the meeting of the Australasian Association for the Advancement of Science in Tasmania, and at that held in Brisbane in January last, by presiding at the daily meetings of the geographical section. Lady Norman also, by becoming a member of this Society, was the means of inducing other ladies to enrol themselves as members.

The post so ably filled by Sir Henry Norman has now been accepted by His Excellency The Right Honourable Lord Lamington, who promptly acceded to the Council's invitation to become Patron of the Society. His Excellency's extensive explorations and travels combined with his devotion to geographical science will, doubtless, prove a powerful factor in advancing the best interests of the Society.

Finance.—The following financial statement now submitted shows the Society to be on a sound basis.

THE HONORARY TREASURER IN ACCOUNT WITH THE ROYAL GEOGRAPHICAL SOCIETY OF AUSTRALASIA (QUEENSLAND BRANCH).

Dr.

		£ s. d.	£ s. d.
1895.			
July 1.	To Balances, viz:—		
	In Queensland National Bank	22 19 3	
	,, Govt. Savings Bank	51 18 4	
			74 17 7
1896.			
July 1.	,, Subscriptions and Entrance Fees	121 12 3	
	Subscription towards Education Address ..	6 0 0	
			127 12 3
	,, Interest on Savings Bank deposit ..		1 15 9
			£204 5 7
1896.			
July 1.	To Balances on hand, viz.:—		
	In Savings Bank ..	53 14 1	
	,, Queensland National Bank	13 12 9	
			£67 6 10

Cr.

			£ s. d.	£ s. d.
1895-6.				
	By Advertising		1 5 6	
	,, Furniture Press		1 15 0	
	,, United Service Institute, attendance, &c.		10 0 0	
	,, Sundry expenses, meetings, exchanges		5 4 2	
	,, Library		3 1 6	
	,, Printing, stationery, binding, &c.	71 17 8		
	Education Address and postsge ..	14 0 5		
	General account	27 4 6		
			113 2 7	
	,, Fire Insurance		2 10 0	
				136 18 9
	,, Balance—			
	In Govt. Savings Bank ..		53 14 1	
	,, Queensland National Bank		13 12 9	
				67 6 10
				£204 5 7

E. & O. E.

Brisbane, *July 14th, 1896.*

JOHN FENWICK, *Hon. Treasurer.*

Examined with Bank Books, Vouchers, etc., and found correct.

ALEXR. MUIR, *Hon. Auditor*

Brisbane, *July 17th, 1896.*

Meetings of Council.—The first Council meeting of the Eleventh Session was held on August 3rd, 1895, since which date ten ordinary meetings and three special meetings have been held.

Ordinary Meetings of Members.—During the Session ten meetings of members were held, two of which were special. At these meetings the following Papers were read :—The President's Annual Address on "The Physical Geography of Australia," by Mr. J. P. Thomson, F.R.S.G.S., etc. "Antarctic Exploration"—by Major A. J. Boyd (illustrated by beautiful lantern slides). "The Blossoming of the Eucalyptus"—by D. R. McConnel, Esq., M.A. "Captain Cook's First Voyage to Australia"—by Sir Henry Wylie Norman, G.C.M.G. "On the Derivation of the word 'Kangaroo'"—by E. Tregear, Esq., F.R.G.S. "Captain Pennefather's Exploration of the Batavia, Coen and Archer Rivers"—by Major A. J. Boyd. "On the Alleged Leakage of Artesian Water"—by J. P. Thomson, Esq., F.R.S.G.S., etc., President. "Aboriginal Rock Pictures"—by R. H. Mathews, L.S., Parramatta, N.S.W. (illustrated by admirable paintings). "Artesian Water Supply"—by W. G. Cox, Esq., C.E. "The Site of Captain Cook's Monument at Cooktown"—by the Hon. A. C. Gregory, C.M.G. "The Discovery of the Mission River"—by Rev. W. Hey. "The Initiation Ceremonies of the Aborigines of the Upper Lachlan"—by R. H. Mathews, L.S., Parramatta, N.S.W. Prize Essay on the "Physical Geography of Australia"—by Miss Mildred Finlay. "Leakage of Artesian Water"—by Hon. A. C. Gregory, C.M.G.

Publications.—The tenth volume of the "Proceedings and Transactions" has been published, and furnishes one of the best of the Society's volumes. There has been a great demand for back numbers, and also for complete sets of the "Proceedings" from Russia, Sweden, Schleswig-Holstein, and the Netherlands India. These requests have been complied with, although owing to Vol. I. being out of print it was impossible to supply complete sets. Of the President's Address on the "Physical Geography of Australia,' 1000 copies were printed and circulated throughout the schools, public and' private, in the colony, and with the view of inducing the pupils to take up the subject of geography, prizes were offered for essays by school children on any portion or on the whole of the subject matter of the address. Unfortunately the Department of Education declined any assistance in the matter, and consequently the distribution was effected through private subscription. The Prize Essay was awarded to Miss Mildred Finlay, daughter of Mr. Reg. E. Finlay, of the Queensland Investment Co. The essay by that young lady was considered as most meritorious, and was unanimously awarded a gold medal. The essay was read by Mrs. Boyd at the last ordinary meeting of members and elicited general commendation.

Library.—The Library of the Society has been enriched by a large number of special donations from members, and especially from Sir Henry Norman. The exchanges and donations from Australasian and foreign societies have been so numerous that the task of the Hon. Librarian has become one of no small importance. The limited space at the command of

the Society for the proper disposition of books, maps and pamphlets renders it highly desirable that increased accommodation for their valuable works should be provided. Unfortunately the premises so generously lent to the Society by the Government will not admit of much further expansion. The Library is insured in the New Zealand Insurance Co. for £500—a sum which falls far short of the intrinsic value of the books, many of which could never be replaced in case of loss by fire. The thanks of the Council are tendered to the numerous donors in all parts of the globe for their generous gifts of valuable works. The United States Government, through the good offices of our President, regularly forward the Pilot Charts for each month of the Pacific and Atlantic oceans. These are most valuable contributions to the nautical literature of the Society.

Exploration.—Much attention has been given by the Society to the subject of Antarctic Exploration, but owing to the long continued depression in the financial affairs of the colony no assistance towards this end could be afforded either by the Government or by private individuals.

The present Calvert Exploring Expedition which lately left Adelaide to examine and thoroughly chart the as yet unexplored portion of Australia, has been hailed with great satisfaction, and much interest is shown in the matter. The Nansen Polar Expedition is watched with great interest, as will also be the balloon experiment for Polar research about to start from Spitzbergen under the auspices of M. Andrée, the Norwegian aeronaut.

Honours to Members.—A graceful tribute to the scientific work of the Hon. A. C. Gregory, C.M.G., was paid to that esteemed member of Council by the Royal Society of New South Wales by conferring upon him the Clark Medal for 1896, in recognition of Mr. Gregory's great services as an explorer and as a contributor to geographical and geological science.

Report on the Sixth International Geographical Congress, held in London, 1895—by Professor Hugh Robert Mill, D.Sc., F.R.G.S., &c. An exhaustive and highly interesting report was received from Professor Mill, and the cordial thanks of the Society were conveyed to him for so efficiently representing the Society at that meeting.

Address to His Excellency the Governor.—In accordance with a resolution of the Council the President, Mr. J. P. Thomson, and the Hon. Secretary, Major A. J. Boyd, waited on His Excellency Lord Lamington shortly after his arrival in Brisbane and presented him with an address of welcome, together with two bound volumes of the Society's "Proceedings and Transactions." His Excellency was pleased to accept the address and signified his pleasure at becoming Patron of the Society. A farewell address had previously been presented to his predecessor, Sir H. W. Norman.

Reciprocity.—The Council has much pleasure in acknowledging the cordial relations existing between the Queensland Society and foreign societies, both in Europe, the United States of America, and in the East.

Intercolonial Geographical Conference.—Negotiations have been for some time proceeding between this Society and the New South Wales, Victorian

and South Australian branches, having in view the holding of an Intercolonial Conference. Up to the present no definite arrangement has been come to, but it is hoped that ere long this much to be desired end may be attained.

For the Council, A. J. BOYD,
Hon. Sec.

Major Boyd moved, and Mr. J. Irving seconded, the adoption of the report, and the motion was unanimously carried.

Mr. A. Muir then read a most interesting paper, descriptive of the work of the Society since its inception in 1885.

Major Boyd said that Mr. Muir had read a most excellent historic paper, and he moved that it be printed *in extenso*. Mr. James Allan seconded the motion, which was carried unanimously.

Election of Officers.

The President declared that the following members of the Society had been unanimously elected to serve on the Council of the Society for the ensuing session :—J. P. Thomson, F.R.S.G.S., etc. ; Hon. A. C. Gregory, C.M.G. ; Major A. J. Boyd, Q.A. ; John Fenwick, A. Muir, J. Irving, C. B. Lethem, Captain W. C. Thomson, T. Myline, Lieut.-Colonel H. C. Stanley, J. Allan, W. G. Cox.

It was moved by Major Boyd, and seconded by Mr. James Allan,—"That Rule 13 of the Constitution be suspended to enable the present occupant of the chair to serve a third term of office." The rule was unanimously suspended, and on the motion of Mr. A. Muir, seconded by Mr. J. Allan, Mr. J. P. Thomson was unanimously re-elected to the office of President. Mr. A. Muir was elected Vice-President, and Mr. James Irving Hon. Treasurer.

The President moved, and Mr. Allan seconded, that Major A. J. Boyd be elected Hon. Secretary for the ensuing session. Carried unanimously.

Mr. John Fenwick was elected Hon. Auditor.

The meeting then closed, the President announcing that the conversazione would take place at the Society's rooms on Wednesday, the 22nd instant, when His Excellency the Governor would be present.

JULY 22, 1896.

The Anniversary Meeting and Conversazione was held at the end of the session. The President, Mr. J. P. Thomson, F.R.S.G.S., etc., occupied the chair, and His Excellency the Governor was present as Patron of the Society. The attendance of members and visitors was larger than on any previous occasion.

The proceedings were opened by the delivery of the President's Anniversary Address. Mr. Thomson chose "Geography in Australasia" as his subject, and spoke for over an hour.

His Excellency Lord Lamington moved that the cordial thanks of the Society be conveyed to the President for his able address and that it be

printed in the Proceedings of the Society. This was seconded by the Hon. A. C. Gregory. The motion was carried by acclamation, and the President returned thanks.

Diplomas of Fellowship.

Three Diplomas of Fellowship—one to Sir William MacGregor, one to Hon. A. C. Gregory, and one to Major Boyd—were presented by the President, Mr. Gregory receiving the Diploma on behalf of Sir William MacGregor. In presenting them the President referred to the valuable services of each of the three honoured members of the Society.

Subsequently some excellent limelight views of the most recent pictures of the moon taken by the Lick telescope, were shown by the President, and the party then adjourned for refreshments.

LIST OF MEMBERS

(P) Members who have contributed papers which are published in the Society's "Proceedings and Transactions." The nnmerals indicate the number of such contributions.

(PP) Past President.

A dagger (†) prefixed to a name indicates a member of the Council.

Life members are distinguished thus (*).

Should any error or omission be found in this list, it is requested that notice thereof be given to the Hon. Secretary.

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TRANSACTIONS

OF THE

Royal Geographical Society of Australasia,

BRISBANE.

Notes on Mining Life and General Features of Pahang, Malay Peninsula.

By W. Bertrand Roberts, J.P., &c.

[Read at a Meeting of the Society, August 31, 1896.]

I propose to give a few notes on the mining prospects and general features of Pahang, chiefly known to Australians by it being the *locale* of the Raub Gold Mining Co., which created considerable stir when floated some years ago.

The usual route from Australia is by B.I. steamer to Batavia; thence to Singapore by one of the numerous boats that run across every few days, the trip from Batavia taking about forty-eight hours. Singapore can also be reached equally well from Sydney by P. and O. steamer to Colombo, changing there into the weekly mail boat going East from London.

From Singapore there are various small coasting steamers that ply up the eastern coast of the Peninsula, the trip to Kuala Pahang taking about twenty-four hours.

It may be well here to give a few details as to names that will simplify matters to anyone reading Pahang news.

"Kuala" always means the mouth of a river, either when it debouches into the sea or joins another; "Kuala Pahang" is therefore where the Pahang River joins the sea, while "Kuala Semantan," "Kuala Tambeling," "Kuala Lipis," &c., are where those respective rivers run into the Pahang River. In like manner "Sungei" is always a river, whether large or small, and "Bukit"

a hill scarcely attaining to the dignity of a mountain : hence the "Bukit Koman," "Bukit Malseed," &c., often spoken of in the Raub mining reports, mean hills of those names.

Again "Ulu" also, always means the head waters of whatever river it is applied to.

Owing to the north-west monsoon, the East coast of the Peninsula is almost closed to shipping from November to March, the few boats that do run intermittently from Singapore during that time charging double rates, and no insurance can be obtained on them.

Like Queensland, most of these rivers have a bar at the mouth, the navigating of which during the monsoon is a difficult and dangerous matter.

One advantage the East coast has in being exposed to the monsoon is that it is a succession of clean sandy beaches, while the West coast, bordering on the Indian Ocean, for lack of that purifying influence, is much like a good deal of our Queensland coast, abounding in mud, mangroves, and mosquitoes.

All the gold mining in Pahang is being carried on in the Ulu, about 250 miles up-country, the stores, machinery, and passengers being taken up by Malay boats, which can carry up to 8 or 9 tons per trip, taking from three weeks to a month to do it. Though slow, the cost of freight is (compared to many mining fields), very low, only running from £2 to £3 per ton for the 250 miles. Hence, when the mines are located reasonably close to deep water, the item of freight is not a serious one. Of course steamer freight from Singapore to Kuala Pahang and agencies at each of those places have to be added.

The rivers being shallow, with a strong current, the Malays propel the boats up stream by "poling." Six men on each side with long light poles walk along a sort of platform, extending about one-third the length of the boat. Starting from the bow and facing the stern, they stick their poles in the sandy bed of the river and walk towards the stern, pushing as they go. They then release their poles, walk forward again, and repeat the process. They keep time with each other, and it is an interesting sight to see them poling a heavy laden boat. The after part of the boat is built up at the sides and roofed over like a house, and as a cook is always taken, and one can purchase eggs, fowls, ducks,

and rice, it is a rather comfortable mode of travelling, though the confinement in an 8ft. x 10ft. space for so long is irksome.

In time of a fresh in the river, however, as soon as the water gets too deep for the men to touch bottom with the poles, there is nothing for it but to " tie up " at the side and wait till the flood subsides.

The captain, who is also the steersman, squats in a sort of sentry box on the top of the roof, and steers with a lever that goes back over the roof and is connected with the rudder. It is rather exciting work getting up some of the " jerrams " (rapids) of which there are a few to be passed, and occasionally, though seldom, a boat gets lost. In the latter case it is good-bye to the stores on board, as the bed of the river is a continually moving bed of sand, and in a short time the boat is buried in it as it piles up directly it meets any obstruction. The spot where a steam launch sank some years ago is now an island in mid-stream covered with young jungle, and was formed in that manner. In the upper reaches of these rivers, and in the smaller streams the travelling is done in sampans or " dug-outs " which the Malays are clever at making and dexterous in handling. One, or sometimes two men, pole in front, much as in the larger boats, while one at the stern steers with a paddle. When they come to a rapid, if an easy one, they " shoot " it, one man standing in the bow fending her off the rocks with a pole.

This is a most exhilarating experience, with the water foaming and boiling up all round ; but if a rock be hit, it is not so pleasant, as it means a good drenching and the loss of provisions, &c.

There is not much actual danger, as most of the Malays can swim like fish, and in the event of a capsize their first care is to get their " tuan " (master) ashore safely. If the " jerram " is too awkward to be shot in that way they land the stores, carrying them down to smooth water below the falls, and there lower the empty sampan over with a rope.

On the larger rivers you are continually passing Malay " campongs " or villages on the banks, each with its paddy-fields, its cocoanut groves, and its herds of water buffaloes, making a very pleasant picture. Cleanliness of person certainly comes *before* godliness in a Malay, and each house has its little floating stage

of logs where they all go mornings and evenings to bathe, the women taking with them their bamboos to be carried back full of water. A favourite mode of cooking rice with them, when travelling, is in a bamboo. They cut off a length, say 18in. below a joint; in this they put just sufficient dry rice to swell and fill it, fill it up with water and put it on the fire. When it has boiled dry the bamboo is full, and the rice cooked as only a Malay or Chinaman can cook it.

In travelling in a sampan on the smaller rivers, however, the villages are not so plentiful, and you may go many miles without seeing a glimpse of the sun, the banks being completely overhung by dense jungle, the large trees being matted together by vines and creepers, and smothered with orchids and other parasitic growths.

The water, flowing through the shady jungle bed, is always deliciously cool and generally very pure. Many people are afraid of drinking the water from jungle streams without filtering it, but I have drunk from some hundreds of them and never felt any ill effects from it. The whole face of the country, except patches of clearing on the banks of the rivers, is all dense jungle.

There are in the jungles some ten or twelve kinds of serviceable hardwood, while a sort of bastard cedar, called "Marenti," which grows in profusion, is generally used for furniture and general house purposes, and takes a good polish.

In jungle clearing the Malays take advantage of its matted character, and having found a tree with a good "lean," they cut all the trees *half* through for an acre or so ahead of it, then they cut the leaning one right through; in its fall it takes all adjoining trees with it; they in turn drag others, and the whole lot goes down like a house of cards, with a mighty crash. In travelling through the jungle, where you can find a Malay path or an elephant pad going in the direction you wish to go, it is absolutely necessary to keep a Malay or two ahead, with a "parang" or chopping knife, cutting a passage through the undergrowth wide enough for you to pass.

Though this jungle is full of animals it is but rarely you can get a shot at any of them; the undergrowth being so thick, they can hear you and make off long before you get a chance of seeing them. The larger animals, such as elephants, tigers, "sladang"

(a huge wild buffalo) and deer, are fairly plentiful. For people who can spare the time for it, and want big game, the best way is to select a favourite "genot" or salt lick, which is to be found at intervals, and make the coolies build a platform in a tree some fifteen or twenty feet from the ground. The grass eaters, elephants, deer, sladang, etc., go there to lick and the carnivora to look for them. Having chosen a moonlight night, the sportsman climbs on to the platform about sunset and lies down and waits, and is generally sure of getting a pot at big game before morning. Nothing short of an express rifle is of much use, as the elephant, tiger, and sladang, can carry away a lot of lead.

Of birds, the "Buku," a large pigeon, much like the "whampoa" of Queensland, is plentiful, but he generally flies and sits very high and is hard to kill. In the river clearings and paddy-fields there are plenty of snipe and twenty or thirty brace is an ordinary "bag" for a day's sport. The Rifle Bird is plentiful and so is the Great Hornbill, with a huge red beak and a voice like a foghorn. Wild peacocks and jungle fowl are also fairly plentiful, besides hundreds of smaller birds.

Of poisonous reptiles and annoying insects the country is remarkably free. Of snakes there are various species, but though I have made careful inquiries of the natives, I fail to learn that any, with the exception of the "Hamyarad," are deadly. The latter, however, of which there are some good specimens to be seen in the Singapore public gardens, is certain death. In various instances that I have heard of, during my stay in the country, death has resulted within a few hours of the bite. Some of the other kinds are surprisingly handsome. I have a very fine specimen, about three feet long, killed by myself and preserved in spirit, which is a marvel of colours. The head, about a foot of the tail, and the belly, are of a brilliant carmine; there is then a stripe of diamond-shaped black spots along each side; then a band, about half an inch wide, along each side of bright blue; and the back is a sort of diamond-shaped pattern of jet black. There is also the "python," a sort of large edition of the carpet snake and, like his Queensland congener, fond of hen roosts.

There are also centipedes and scorpions, the former much like

the Queensland ones but not plentiful. The scorpion, however, is a most formidable fellow; he is jet black and fully a foot long from the end of his claws to the tip of his tail, which carries a most formidable horny curved sting; his claws are as large as those of an ordinary crab, and he marches with his tail over his back ready for instant action. Of ants, flies and mosquitoes there are very few, though on wet nights the sandflies are rather troublesome. Taken as a whole, however, the country is singularly free from the many insect pests that make life a burden in some parts of Queensland.

As for the Malay himself, take him for all in all, he is a good fellow, with a great deal of "nature's gentleman" about him. Admittedly, from a white man's standard, he is thriftless and indolent, but that is probably hereditary and the result of centuries of easy living before the white man came, and is hardly to be wondered at. Given a clearing by the side of a river, enough to grow what rice he requires, a patch of cocoanut trees (which bear continuously), a few buffaloes, the river to set his fish traps in, and a boat to take him on his trips, and he has very little necessity for any hard work. True, since the advent of the "orang puteh," or white man, he has acquired more luxurious tastes and likes to buy many coloured silk "sarongs" and fearful and wonderful caps, smoke cigarettes, etc., and to be able to do this the younger men come and work for a while at the mines. As soon as they have accumulated what they consider sufficient for the time they leave and return to their campongs, and put on "side," to a great extent, and air their new clothes. When they want a few more dollars, they go back to the mines and do a few more months' work, and so on. They have a great aptitude for machinery, and make excellent and reliable engine drivers, and besides do all the surface and jungle work. It is only a few of the more "brain" or brave ones who can be induced to go underground.

In temperament the Malay is obedient, polite, and very careful of anything entrusted to his care

With say, 100 of them living in one "banksal" or coolie house, it is most unusual for the slightest trouble to arise amongst them, and very rare to hear an angry word spoken. What would be the result of 100 young white labourers under

similar conditions, and under comparatively no discipline, can be easily imagined. The same thing is noticeable in their "campongs," where it is very rare to hear the parents speak harshly to their children, and, as far as I know, personal chastisement is never resorted to.

Being Mahommedan, anything in the way of strong drink is forbidden, and this doubtless also tends to preserve harmony among them. Those whc have made the pilgrimage to Mecca, which it is the aim of all Mahommedans so to do, are distinguished by the prefix of "Hadji" to their names, and are treated with a considerable amount of respect by their fellows. The form of salutation between strangers, or from a young man to an old man, is quite polite and graceful. They take the tips of each other's fingers as in shaking hands, bow, then place their own fingers to their lips or heart.

In the more thickly populated campongs you will see a "musjid," or church, at intervals of every ten or fifteen miles, well kept, built of sawn timber, and painted. The average Malay house could generally be bought for thirty or forty dollars, but in the case of their church, it is no uncommon thing for it to cost 400 to 500 dollars; and, to ensure its being well built, the contract is generally given to Chinese carpenters, who are better artizans than the Malays. All this is accomplished and the money raised among them without the least fuss, and without any of the strenuous efforts and cajolery that seems necessary among our own people for similar objects.

Owing to their being Mahommedans, they also have to observe the "Bulan Puasa," or month of fasting, corresponding to the "Ramadân," or ninth month, which is observed with such fervour among the Mahommedan population of India, Persia, etc. During the "Bulan Puasa," they do not eat, drink or smoke between the hours of 6 a.m. and 6 p.m. The Malay observes two holidays during the year—the "Hari Raya Puasa," which follows the month of fasting, when they put on their best clothes, club together, and kill a bullock, fowls, etc., and have a good time; and the "Hari Raya Hadji," which is their great day, and occurs a little later on. On this day they are supposed to call on each other and make up whatever quarrels may have occurred between them through the past year.

They have but few games; a few sword-dances, with many fancy posturings, and a sort of football played with a hollow wicker football, in which the players stand round in a circle and kick the ball up in the air from one to the other, the point of honour being to keep it off the ground as long as possible. A few months back I was surprised to learn that they played chess. Their pieces correspond to ours, having the same moves; the king being known as the "Rajah," the knight as the "Kuda" (horse), and so on. When giving check they call "Soh," and play the game in all its intricacies, exactly as we do. On reflection it is not so surprising to find it here, as it is said to have existed in Persia and India centuries before we got hold of it.

The Malay, as previously stated, is always found located beside a river, and is probably a descendant of the old piratical man of the sea, whose forefathers gave such a bad reputation to the Straits of Malacca, and such a bad turn to any merchant shipping who were unfortunate enough to fall into their hands. In the course of years they have doubtless worked their way in from the coast and settled along the river banks.

The true aborigines are beyond doubt the "Sakeis," known to the Malays as the "Orang Bukit," or men of the mountains. These are always found located in secluded spots among the mountains, and are of a very low type of humanity, probably closely corresponding to Stanley's dwarfs in Central Africa. They are generally found in small communities of half-a-dozen families or so, though occasionally they number several hundred. They are below the normal height, but very muscular, speak a language of their own, unknown to the Malays, largely composed of gutterals, and wear their hair in a huge mop like Rudyard Kipling's "Fuzzy Wuzzy" of the Soudan.

In their own retreats they wear no covering whatever, but when they come among the Malays or in the vicinity of Europeans they, with doubtless a laudable desire to conform to the usages of polite society, put on what may be considered their dress clothes. These I may mention consist *in toto* of a narrow strip of grass cloth twisted round their waist and then brought between their legs and the end tucked through their waistband.

The women, when young, are of lighter complexion, better

developed and better-looking than the Malay women, but hard work and bad living soon make them hideous. They, on the contrary, are always clothed, and have a great idea of ornaments, such as strings of beads, and a large bunch of flowers thrust through a hole in the lobe of each ear. Like Stanley's dwarfs again, the only weapon in use by the men is a bamboo blowpipe and poisoned darts, in the use of which they are very expert, bringing birds off the highest trees with them.

The blowpipe consists of a bamboo stem about 8 feet long, hollowed out, and generally nicely carved. A second smaller tube is inserted in this, with a wooden mouthpiece. The darts are about 15 inches long, about as large as a fine knitting needle, an inch of the point being poisoned. A small piece of light wood, just fitting the tube, is fixed to the other end. They are carried in a sort of quiver that will hold about a hundred, in which there is always a supply of native cotton to use for wads. I have seen them at my request stick them in a knot on a tree 150 feet away, using them as quickly as an expert pigeon shot will his gun. They are generally badly afflicted with skin diseases, the result of bad feeding, some of them being a mass of scales. They are very dirty feeders, living chiefly on roots and game they kill. This is a very elastic term with them, and means anything that runs, flies, swims or crawls; whether it was killed that day, or died a natural death a month previously, is a matter of no consequence, as long as it is not too "ripe" to hold together. They also set awkward-looking spear traps for wild pig, deer, etc., in the jungle paths, and great care has to be exercised when approaching a Sakei village on that account.

If an elephant or other large beast happens to die in the jungle, the Sakeis from the nearest village will take up their residence for a few weeks near it, and gorge themselves till only the bones remain.

I am, I believe, one of the very few white men who have spent two days and nights, living in a Sakei house.

I wanted to inspect some alluvial workings in an out-of-the-way place that I had been told of by a Sakei, and went on a sort of exploring-cum-prospecting trip, taking ten days.

The house that I stayed in was built like the ordinary Malay house, on posts about 5 feet from the ground, several other

families living in a house perched about 30 feet from the ground, three or four trees close together having been selected and a platform built by lashing a sort of scaffolding poles from one tree to the other, and then building a fair-sized house on them. I was offered my choice of residence, but decided to roost low, as the consequences, if one fell overboard, would have been disastrous. This was reached from the ground by a ladder of round sticks, set at an angle of about 50deg., and to show how quickly animals as well as men can adapt themselves to altered conditions, these people had a dog that used to ascend and descend this ladder, as if he and his ancestors had been climbing trees all their lives.

About 8 p.m. it was "lights out," and then for a couple of hours issued some of the strangest, but withal, the most melodious singing, or intoning, I ever heard. One treble voice would take up the recitative, then two or three others would join in, and finally the whole party—men, women and children, including our neighbours in the tree-house—would join in a weird chorus, which would finally die away in an indescribable manner. In a few minutes another treble would start, and so on. It was not unlike the intoning of an anthem by a good choir, but much finer, time and place adding to the effect. This is the more remarkable from the fact that the ordinary Malay singing is a series of discordant howls, calculated to make the man who is compelled to listen to it wish he might be struck temporarily deaf.

While there my boy bought what fowls we required from them, and on leaving I gave them a couple of dollars, for the use of the house, with which they were highly pleased, and we parted on the best of terms.

The Government of the country is what is known as a "Protected State," *i.e.*, though nominally governed by the Sultan, whose signature has to be affixed to all State documents, and who is paid a pension in lieu of his former revenues, it is to all intents and purposes a British colony. A pension is also paid to the chiefs of the various districts, and a small allowance to the local "Penghulus," or head men of the larger campongs, contingent on the good behaviour of their charge.

There are various European magistrates stationed in charge of districts, who have a small force of Sikhs under their control for

police purposes. These magistrates collect revenue, adjudicate on what civil or criminal cases are brought before them, and if the litigants do not always get strict law they generally get what is much better—justice. The salaries paid these magistrates, who are generally young fellows of good family, who have come out to win their spurs, are small, but so also are their duties, and there is always the prospect of future advancement ahead of them, like the proverbial marshal's *baton* of the French soldier.

The history of the British entry into Pahang is interesting, as showing the insinuating little way in which John Bull gets his claw on the uttermost parts of the earth, and "sits tight" when he once gets it there.

Ten years ago Pahang was a *terra incognita*, and the Europeans who had visited it could be counted on one's fingers. Rumours of vast wealth in the shape of gold mines began to be noised about, so the British Government felt it incumbent on them to send a Resident to live at the Sultan's Court, ostensibly to protect the British subjects who were anxious to enter the country on gold mining bent. Actually, as seen by the light of subsequent events, his real mission was to spy out the land, keep the British Government advised of all that was going on, and pave the way for the establishment of a Protectorate.

Hugh Clifford, the present Resident, was the man who was sent, and how he made a study of the Malay language and character, ingratiated himself with the Sultan and finally succeeded in his mission, are now all matters of history, The various Protected Native States have lately been federated, and are now controlled by a Resident-General, and doubtless in the fulness of time the polite fiction of "protected state" will be thrown off, and they will become known officially, as what they now are in reality, a British colony.

The next provinces to fall into the maw of John Bull will doubtless be the Native States to the North—Kelantan, Trenganu, Patani, and others, all reputedly rich in minerals. At present the sultans of those States are in a tight place.

Occasionally adventurous white men go prowling up through them, and generally get all sorts of obstacles thrown in their way, and are politely advised not to stay in the country as they might get hurt. It is a certainty that they would come to grief in short

order, were it not that the sultans know that that would precipitate what they are anxious to avoid, and that the country would promply be garrisoned and taken over by British troops. Hence instead of "Kris-ing" the intensive white man, they temporise with him, but all to no purpose, for it is writ large that it is only a matter of a few years when the whole of the States to the North, right up to the boundary of Siam, will become a British colony.

It is well that it should be so, as under present conditions none of the industries of the country are being developed. The sultans live in a sort of barbaric splendour, what with women, gambling, opium smoking, cock-fighting, &c., and the people are subjected to ceaseless extortions and nameless cruelties to find the wherewithal for their royal master to pursue his debaucheries.

There is but little doubt that the great bulk of the people would hail with joy the change of rulers. In Pahang this feeling is very noticeable. In conversation with various intelligent Malays, they have all been quick to point out the improved conditions under which they now live, and their present comparative state of affluence. As an instance, some years ago on the first coming in of the British, eight and ten fowls were to be bought for a dollar. Now there is a ready sale for all they can raise at only three for a dollar. A sampan that formerly could be bought for six or seven dollars now costs twenty dollars, and so on. For any Malay who wants it, there is plenty of remunerative work to be had, while they have a thorough belief in the word and good faith of the British.

In my opinion it would have to be very outrageous treatment that would induce another insurrection in Pahang.

In the old days, a man's women, his labour, and his property were all at the command of the rajah, whenever he chose to exercise the right. Now the Malay literally sits in the shade of his own cocoanut tree, secure in the possession of his property, "none daring to make him afraid."

Personally, I fail to see any very rosy future for Pahang unless it arises from its gold reefs. The soil, generally speaking, is a cold hungry clay, the result of the decomposition of the "clay slate" which is the general country rock. For grazing purposes it is useless owing to the dense jungle, while the soil is in my opinion

too poor for agriculture. It is claimed that coffee-planting can be made a success here, but that has yet to be demonstrated.

Those who take an optimistic view of the future of Pahang, and quote the neighbouring states of Perak and Selangor as examples, forget that those states started with a splendid credit balance of vast deposits of shallow alluvial tin, which, with the unlimited supply of cheap labour available, were and still are being worked at an enormous profit to the State. These profits enabled them to open up the country, make roads, bridges, telegraph lines and railways, and pave the way for the planter. Pahang, for geological reasons which I shall adduce later on, does not possess these advantages, hence its future (apart from its gold reefs), is to me a matter of doubt.

One of the chief difficulties Pahang has laboured under in the past has been the absence of any means of ingress and egress, save by the native boats on the Pahang River, and a bridle path from Selangor to Kuala Lipis, the capital of the Ulu, and the probable future capital of the State. They have now in hand the making of a military trunk road, in the same direction, connecting with the Selangor Railway terminus at Kuala Kubu, and the extension of this railway to Kuala Lipis is within measureable distance. When this latter is *un fait accompli*, it will place Singapore within three days touch of Ulu Pahang instead of about a month as at present. There can be no two opinions as to the wisdom of making this road and railway, though a more progressive Government would in the absence of roads have had a steamer plying on the Pahang River, carrying mails, passengers, and cargo.

I have never seen an official statement of the number of Chinese employed in tin mining in Perak and Selangor, but I should not think it fell below 100,000, especially when it is remembered that it is not unusual for from 2,000 to 3,000 to be employed in one mine. As the coolie spends almost all his earnings in gambling and opium, the bulk of which goes into the Government Treasury, the value to the State of this class of people can be readily understood, and no wonder the Government of Pahang look with envious eyes at the neighbouring states, on the other side of the Main Dividing Range.

In the matter of climate, Pahang may be considered fortunate. Situated only 4deg. North of the Equator, it might reasonably be

expected to be excessively hot, but such is not the case. Being only a narrow strip of land, say about 300 miles wide, with an ocean on each side; covered with a dense green jungle, and with a heavy regular rainfall, the thermometer seldom registers more than 90deg. in the shade, and that for only a couple of hours or so at midday; the mornings and evenings being delightful.

As a set-off against this, however, it may also be said that it seldom falls below 80deg. even at night. As a consequence, it is a steaming, trying heat, the least exertion, even of walking, causing a profuse perspiration. This continuous sameness of climate is said to be very prejudicial to European constitutions, and it is considered advisable for every one who can manage it, to take a trip to a cold climate every three years or so. Queensland men, however, do not seem to find any ill effects from it. No such violent extremes of heat and cold, wet and dry, are ever found here as in Australia, hence it is a much more comfortable climate to live in, if not so healthy.

The rainfall as I before mentioned is about 160 inches per year. Of this, about one-third falls during the three months of the wet monsoon, and the balance pretty evenly distributed month by month, seldom more than one inch falling in any one twenty-four hours. Another peculiarity is, that a wet day is practically unknown.

Most new-comers are attacked with a sort of bilious fever, probably due to the liver failing at first to accommodate itself to the increased work thrown upon it. Some recover, others do not. I myself very nearly died from it. If they get over it, they as a rule only suffer afterwards from a mild form of malarial fever and ague that prevails. This, though unpleasant, is not dangerous, and only lays one up for the day on which it occurs. The usual symptoms are the shivering stage, the hot dry stage, and finally a profuse perspiration with a bad headache for the rest of the day. Some people are also attacked by dysentery, and it is often necessary to leave the country to get rid of it.

The geographical and geological conditions may be roughly said to be as follows:—Bounded on the East by the China Sea, on the West by the States of Perak and Selangor, on the South

by the native State of Johore, and on the North by the native States of Kelantan and Trenganu.

It is divided from Perak and Selangor by a huge backbone mountain range of granite, which appears to run right up the centre of the Peninsula, and generally from 2,000 to 3,000 feet high.

The geological formation of Pahang is a soft clay slate, which under the climatic conditions prevailing, rapidly decomposes and forms a bed of red clay from 10 to 100 feet thick, the shallowest portion being found in the valleys, owing probably to the denudation, owing to the excessive rainfall going on faster than the decomposition of the country rock. It is unusual to see any rock outcropping, hence prospecting, coupled with this depth of soil and dense jungle, is a matter of great difficulty.

It is for the above reasons I maintain Pahang cannot expect any great extent of alluvial tin, such as made Perak famous.

Then, in occasional places, the base of the granite dividing range may impinge a few miles into Pahang territory, and occasional intrusive masses of granite occur in other places, but these may be taken as the exceptions that prove the rule. As far as I can learn, no tin lodes of any value, have been found in Perak and Selangor to account for the vast quantity of alluvial tin, nor has any serious efforts been made by the Governments of these States to assist or encourage searching for them, though doubtless they exist somewhere.

Strange to say, the only payable lode of tin being worked on the Peninsula is situated in Pahang at a place named "Quantau" on the East coast, near the sea. There they have what is said to be a true lode, have twenty head of stampers at work on it, and make a large and regular monthly output of a payable character. Every small creek in Pahang Ulu is riddled with holes made by the ancient gold workers, but this by no means presupposes that it has been rich. Owing to the dislike of the Malay to get his head out of sight of daylight, his method was to sink a hole down to the "karang" or washdirt, gouge out a foot or so all round the hole, and then sink another. Hence the ground is probably not more than half exhausted. I have had many of these blocks tested but never found anything that could be considered as approaching payable. In conversation

with some of the old men also, I learnt that their earnings were very small.

In many places in the banks of the Pahang River large beds of wash are to be seen, and it is possible that back from the river in the old river flats payable "leads" of alluvial may exist. If so, an immense area of country would be available, as these beds of wash can be seen at intervals for 200 miles, and the flats run back from the river for from a quarter to one mile wide. Heavy pumping machinery, however, would be needed, as there is no doubt very heavy water would be met.

Pahang owes a deep debt of gratitude—in fact it might be said its very existence, since the British Government took it over some seven or eight years ago—to the efforts of the three large quartz mining companies who have spent much money in doing pioneering work, making their own roads, running their own postal services, and providing their own police staff, &c.; in short, doing all those things themselves which it is generally expected of the Government of a country to do for pioneers who are engaged in opening it up. True, during that time a good deal of gold has been won, but nothing in comparison to the money expended by these companies. They consist of one Hongkong, one British, and one Australian, each holding a concession of an area equal to a fair-sized goldfield in Australia. In position they form an obtuse angle, the length of the short sides being about 40 miles each, and the hypotenuse about sixty miles. Each of these companies has twenty head of stampers at work, and all are now getting more than enough gold to defray expenses. I have no absolute statistics to guide me, but should estimate roughly that about 50,000 tons of stone for an average of about half-an-ounce of gold per ton. From this it will be seen that the ore is, on the whole, low grade, but the ore bodies as a rule are large, the ground easy, timber plentiful, and with the cheap labour a fair profit can be made with a twenty-stamp mill on half-ounce rock.

Raub has a particularly fine showing, and will beyond doubt, with largely increased stamping power, take first rank by-and-bye as one of the big profit sharers of the mining world.

The comparatively recent developments at "Bukit Koman," about three miles beyond the original Raub Hole, where they appear to have got the "mother" lode of the Peninsula, are

magnificent. True, it is rather low grade (say 6 to 8 dwts.), but at the 150 feet level it is opened for 700 feet in length, and will average 12 to 15 feet wide for the whole distance, all of which is milled. The ancients have worked it out to the water level, and as a continuous line of native workings extend for about half-a-mile further at each end, its possibilities are very great.

Similar native workings and indications exist at two other points one and two miles farther on, and I incline to believe in time that the big "Bukit Koman" lode will be found to be continuous for miles in length. It is, taking it on the whole, one of the finest mining properties I have ever seen, and with every prospect of permanence both in length and depth.

There is also a good shoot of probably 2 oz. quartz in the workings below the old "Raub Hole," doubtless a continuation of the rich stone that made Raub famous in ancient times. This huge pit, some 60 or 70 feet deep, and of great size, when worked by the Malays, filled up with water so often that the last Rajah who worked it finally gave up baling it, and for some time did what he could by dislodging the rock with heavy chisels fixed to the end of long bamboos, the Malays then diving and bringing up the rock in cocoanut shells.

The main trunk road, now being made by the Government, passes through Raub, and doubtless before long will be connected with "Klang," the port for Selangor, by railway.

The Hongkong Company's mine was also long the scene of active work by Chinese who paid a tribute to the local Rajah. It was in fact in full work up to the time of being taken over by the Hongkong Company. It was more of the character of a bonanza than a defined lode, the huge cuts that were made by the Chinese, the banks of which 100 feet or more in height, and several hundred feet in width, showing that at the surface it must have been very large.

In the absence of means of crushing on a large scale, they broke it up roughly and sluiced it, picked it over for anything carrying visible gold, and stacked scores of thousands of tons of headings, which are worth 3 or 4 dwts. per ton, and are drawn upon when a sufficient supply of ore from the mine is not available. This ore body has been followed down to the 200 feet level, where it is being taken out for a width of 50 feet and all crushed.

There are also large leaders that run off from the main body and are often very rich. I have seen some very handsome specimens from this mine. The Government trunk road from Klang to Kuala Lipis will also pass through it, and it is only four miles from deep water on the Lipis River, hence its position and facilities for working are good.

Some 40 miles further up the Jelai River, are situated the two concessions owned by an English company. One of them has a twenty-stamp mill at work, and a ten-stamp mill is now being erected on the other.

Considerable work has been done here by the ancients, said in this case to be Siamese. On the hill on which the mine is situated, some hundreds of shafts, some of them 100 feet deep, and mostly in good preservation, have been sunk, and considerable ore extracted.

This mine is also within four miles of navigable water on the Jelai River.

Of the *four* gold mines at work, *three* of them are managed by ex-Queenslanders, and most of the European employees also come from Australia.

All the mining work is done by Chinese coolies. Of the Chinese coolie's merits as a workman, he may be briefly described as a perfect whale in soft ground, a fairly good man in easy blasting ground, but of little use in hard rock. I have never seen a party of European miners who could keep up with an equal number of Chinese in soft ground. As a proof of what I say, on one occasion a party of eight, working six-hour shifts, drove a tunnel in forty working days 246 feet and timbered it with ordinary sets, and side and back laths, the tunnel being 6 feet high, 4 feet wide, and all their mullock wheeled out with a barrow. This is a record, as far as my experience goes, with any class of labour. Having said this, however, one has said all, as other virtues are non-existent.

It is almost an essential that anyone who has charge of works in this country should be able to speak Malay. True, it is possible to get on without it, by means of a Chinese interpreter, but this is far from satisfactory, and anyone proposing to make a year or two's stay in the country should certainly make a point

of acquiring sufficient colloquial Malay to serve for ordinary purposes. Especially is this the case when one has to do much jungle travelling and is desirous of obtaining information from the natives as to the locality of old workings, etc.

Till you are able to speak to the Malay in his own language, you will never gain his confidence, and this, when you come to think of it, is only natural.

In concluding this series of notes, crude as they are, I may say they have been jotted down during the three years that I have travelled with, and to a great extent lived among, the Malay people, and during which time I have never experienced anything but politeness and kind treatment at their hands.

The South-Eastern Highlands of Queensland.

By R. M. Collins, M.L.A.

[Read at a Meeting of the Society, September 28, 1896.]

Mr. President, Ladies, and Gentlemen,—By the kind permission of your Council, I am now afforded the opportunity to address you on a subject which has had for myself—I may say all my life—a deep interest (in marked contrast to the absolute indifference with which it has hitherto been regarded by almost everyone), and which, I hope, will, before many years, be found worthy of general attention, for it can hardly be denied that though the climate of Queensland, taken as a whole, is fine and healthy, still it has one serious defect. Who does not long to get away from the moist heat of Brisbane or other Queensland towns in summer-time, up into the comparatively cool, dry air of such places as Tenterfield or Armidale? A change at such times even to Toowoomba or Stanthorpe is very pleasant and beneficial, although those places are not high enough to make the air really cool, whilst their distance from the coast deprives them of the sea breeze. And so it is no wonder that people really needing rest and change in a cooler and more invigorating climate go to New Zealand and Tasmania, or to the mountainous regions of Victoria or New South Wales But unfortunately for most people the expense of such trips would be beyond their means, and so they resign themselves as best they can to "the inevitable," as they regard it, little thinking that within sight of Brisbane there is a fine area of habitable country, and with a climate more equable than perhaps any New Zealand town enjoys—volcanic soil of surpassing richness, deep, shady forests and scrubs, cool running streams, and splendid, bold mountain scenery.

Let anyone on a fine clear day take a walk around Gregory Terrace, Brisbane, and looking a little to the west of south, he may easily see two high peaks. These are known as Mount Lindesay and Mount Barney, about the heads of the Logan, and

some sixty miles distant.* More to the left, eastward, and due south from Brisbane, can be seen the continuance of the Macpherson's Range towards the sea, changed now from a succession of high rugged peaks and deep "gaps" to a more uniform but elevated plateau, varying from 2,500 to 3,500 feet above sea level. The spurs or offshoots maintain an elevation equal to that of the Main Range itself, and then terminate in picturesque headlands, while the deep valleys separating them are flanked always by very high and steep mountain sides; thus the comparatively level land on the top, though very considerable in area, is extremely irregular in shape. This elevated region extends along the Queensland side of the Macpherson's Range for a distance of about twenty miles, with an average depth of perhaps four miles. Viewed from a distance, this mountainous region is often seen enveloped in cloud, or half hidden by misty showers, when elsewhere the sky is clear. The rainfall is indeed excessive, and supplies almost the whole of the permanent running water which reaches the sea by the Logan, Albert, Coomera, Nerang, and other rivers and creeks. The rich alluvial soil forming the flats along these rivers is derived from the same source. With the exception of Tambourine and Beech Mountains (at about 1,900ft.) no settlement whatever has yet taken place on the south-eastern highlands of Queensland, the difficulty of access to it, and the heavy cost of clearing, being quite enough to deter ordinary settlers. This country must be opened up by people who can afford to be satisfied with the results other than a cash return. That there are such people in Brisbane, as in other places, cannot be doubted, but it is equally certain that few, if any, of them realise that there is a large area within sixty miles of the capital where droughts do not occur, and where the enervating heat which constitutes the great drawback to our climate is never felt. Mountains like these are, indeed, to those who live within sight of them, "a joy for ever"; but a closer inspection was made last summer,

The heads of the Logan were first explored by Captain Logan, who, accompanied by Allan Cunningham, ascended and named Mount Lindesay and other prominent features of the district. The other two highest peaks in the neighbourhood were named by these pioneer explorers Mounts Hooker and Clan Morris. Settlement did not follow for some years afterwards, and not unnaturally the early settlers failed to identify the particular mountains upon which these distinctive appellations had been bestowed. Although the name Mount Lindesay has been preserved, it is much to be regretted that it is now applied to the feature originally named Mount Hooker, whilst this latter name and that of Clan Morris have disappeared from the maps altogether. The writer hopes to have an opportunity at some future time of satisfactorily elucidating this subject touching the nomenclature of these predominating features of Southern Queensland.—R.M.C.

when a few friends, in pursuance of a long-cherished plan, spent some pleasant days in the heart of the mountains. A short account of the trip was written by Mr. G. H. Taylor, one of the party, who is a landscape painter. With these few remarks, I may introduce Mr. Taylor's narrative, hoping that it may not be without interest, and may help in some measure to attract attention to an undeveloped source of wealth which might be made available by the many who are unable to spin or toil, for there is a wealth which may not be won by gambling, nor even made by work, but which is the free gift of Heaven alike to man as to the "lily of the field."

THE TRIP.

A party of six friends started in the afternoon of the 13th of November, 1895, from Tamrookum Station on the Upper Logan, and rode up Christmas Creek, through a rich agricultural country of unrivalled beauty, the extremely fertile flats being watered by the winding creek, a never-failing stream, flanked by well-grassed hills, which gain in elevation and boldness of outline as the watershed is approached. Towards evening we had left behind us the last of the narrowing alluvial flats, our road for the last two or three miles having been through standing scrub, between steep mountain sides with frequent crossings of the creek. At dark we reached our destination for the day, Mr. Buchanan's selection, which is the furthermost settlement in that direction. Although we were provided with all the necessaries for camping out, Mr. and Mrs. Buchanan, with the greatest hospitality, made us free of their house, and entertained us most kindly.

The following morning we started off on foot up the bed of the creek, soon getting into a veritable fairyland of palms and ferns. As we went on the stream was broken from time to time by several falls, some being of considerable height, and all beautiful, the bright clear water falling over the blackest of polished rocks into still, deep pools shaded by a wealth of vegetation. The innumerable varieties of scrub trees, sheltered in the quiet depths of the valley, and watered by unfailing streams, here grow to an unusual height, each tree seeming to struggle to overtop its fellows, and obtain a larger supply of the light and air above, so producing tall straight stems of great beauty. At our dinner

camp here, at 2 p.m. the thermometer registered 69deg., and we had still a brisk though smallish stream, at about 2,600 feet above the sea, and judging that we were nearing its source, we breasted the hill on the south side of the valley, through a thicket of palms, tree-ferns, and lawyer cane. Two of the party made a most efficient pioneer force, armed with large butchers' knives, which proved invaluable for cutting through the canes and other light obstructions. In an hour's time we reached the top of the range, getting a grand view "over the border" into New South Wales, the point reached being directly at the head of the middle branch of the Tweed River, above Tyalgam. The river flats stretched away eastwards, into dim distance, walled in on either side by high bluffs. Eastward, Mount Warning stood out in bold relief against an expanse of hazy lowlands.

Turning westwards along the range, we continued to rise, and the highest recorded elevation was where a spur springs from the main range on the Queensland side, forming the watershed between Christmas Creek and Running Creek. Here a comparison of the three aneroids we carried gave a height of 3,500 feet, and the air was deliciously cool and invigorating. We kept the top of this spur for a good way in our homeward course, and making a start down the side in the direction of the creek, camped for the night in a gully, at an elevation of 2,600 feet, and in the morning pursuing our way down the creek, reached the homestead during the forenoon.

After dinner an ascent was made of a mountain at the back of Buchanan's having a precipitous cliff about 500 feet high almost overshadowing the house. Here was a wide view over a great extent of the Logan and Albert country.

Early on the morning of the 15th we were afoot, and scaled a long flat-topped mountain on the south side af the valley, an offshoot of the main range, and, in fact, a part of the same spur upon which we had been two days before, which here becomes an extensive tableland, drained by Waterfall Creek, at a level of 2,300 to 2,800 feet above the sea, for a distance of some three or four miles or more, with a rich soil capable of growing every kind of English fruit and vegetable, and a temperature of 62deg. at midday, while the thermometer was registering 80deg. in the low country not twenty miles away.

Here we met with the remarkable "evergreen beech" trees (*Fagus Moorei*), which form an immense mass of root and timber at the base, forming a kind of platform at some eight or ten feet from the ground, send up a number of separate stems, each one being a big tree, or sometimes several smaller ones clustered round a central giant. These trees, although found in one or two parts of New South Wales, are not known to grow elsewhere in Queensland. They seem to require certain conditions of climate which, if not actual requisites, are at least important factors in the well-being of European peoples. They flourish only at a high elevation, in spots sheltered from violent winds, well watered, and having a very rich soil. All around was a profusion of most beautiful ferns, from the noble tree ferns of great height, down through a very great variety to the most delicate transparent "filmy fern" wreathing their stems.

Perhaps the most striking natural "show" was reserved for the end of our trip, when in following this high level stream, Waterfall Creek, downwards in the direction of Christmas Creek, we came to the waterfall from which it takes its name, and there, at an elevation of about 2,500 feet above the sea, looked over a sheer precipice down into which the water leaps some 190 feet in one drop; then, striking a ledge of sloping rock, it falls again almost perpendicularly another 240 feet or more, the total height from top to bottom being about 550 feet. By making a detour we got down a more sloping face of the mountain, and gained the foot of the falls, and then followed the creek down to its junction with Christmas Creek, thence upwards to our starting place.

All our party felt that these mountains must, as they become known, attract a large number of visitors from Brisbane. The bold grandeur of the rocky bluffs is so impressive, and the rich and varied luxuriance of the scrub vegetation so entrancingly beautiful for all who have any perception of these things, while the pure, clear air, cool in summer and comparatively warm in winter, must impart to all who try it, a quicker vitality and energy. Few people know that there are such places within sixty miles of Brisbane—thousands of acres of land offering a perfection of climate, of scenery and of soil. Higher than Toowoomba by 1,000 feet, while here and there points of the range rise above the

level of Stanthorpe, Tenterfield and Armidale, and over-topping Melbourne's summer retreat on Mount Macedon Nature having done so much for this favored region, it only needs a little enterprise on the part of those able to do so, to open roads and provide accommodation for visitors. To open a new country to "weary Brisbane," and to keep in our own country a good deal of money that is now annually carried out of it, simply because those who want a thoroughly satisfactory change of scene and climate, do not know that it could be had so near home. When this has been achieved, the traveller to the "Southern Highlands" after traversing rather poor and commonplace forest country, will, on passing Beaudesert, be surprised and charmed by the great beauty of the rich pastoral lands extending for more than twenty miles to the foot of the mountains—wide meadow-like flats, bordered by ranges of hills of varied outline, and backed by the higher more distant points of the Macpherson's Range.

Although our trip took place during the last days of a severe drought and the mountain streams were at their lowest they were still running briskly.

Taking leave of our kind host and hostess in the afternoon of Nov. 16th, we retraced our steps, and following down Christmas Creek through a succession of thriving farms—the crops even then looking uncommonly well—arrived tired, but well pleased with our experiences, at Tamrookum before dark.

We had been fortunate in having fine weather during our trip, but the drought was nearly over: we got home in time to escape what proved to be the first of a number of thunderstorms which ushered in a glorious summer.

The few particulars relating to the waterfall constitute the only account yet given of it, and from all we could learn, we were amongst the first to have a near view of it, and the very first to see it from the top: if on these grounds we possess any claim to give it a name our hope would be that it should be called "The Mueller Waterfall" after the distinguished naturalist whose kindly interest in some previous adventures had to a great extent been the cause of our undertaking this one—Baron Sir Ferdinand Von Mueller.

The Western Watershed of the Upper Portion of Cape York Peninsula.

By J. T. Embley, Licensed Suveyor.

[Read at a Meeting of the Society, October 20, 1896.]

Seeing how little is known by the public about the western watershed of the upper portion of Cape York Peninsula, and being, to the best of my knowledge, the only person who has a fairly intimate acquaintance with this part of the Gulf, I have no doubt that the information contained in this paper will prove of some interest, and assist to make known the general character of the country.

Taking into consideration, first, the rivers discharging into the Gulf. It seems remarkable that the rivers north of the Archer should have such fine tidal courses—extending inland, and navigable for small craft drawing 5 feet, for a distance of thirty miles in a straight line. These rivers are the Watson, Embley, Mission, Batavia, and Ducie, and carry their flood waters throughout in one channel; whilst the Archer itself, and the rivers to the south of it, including the Mitchell, have very poor tidal courses, extending but a few miles. All of these rivers overflow their banks in flood time, and the overflow finds its way to the coast in various channels. As an instance, the Mitchell is about one mile wide 100 miles up from its mouth, and about 100 yards in width seventy miles lower down. The others change in a similar manner. The country south of the Archer is fairly level down the Gulf coast, extending inland for a distance of fifty or sixty miles, whence it becomes gently undulating, and generally maintains this character until meeting the dividing range. To the north of the Archer the conformation of the country almost from the coast is of an undulating nature, and the river channels in parts have been eroded through gravelly ridges, the gravel being obtained from the partial decomposition of a "pebbly conglomerate ironstone" formation, which covers the principal area in this particular part. This erosion has given the channels high, steep banks in some places. This is particularly noticeable along the

Watson River, which is the first one north of the Archer, and which discharges into that river about three miles up from its mouth. This, I think, is the channel that Captain Pennefather went up about fifteen years ago, and it was locally reported that he described the Archer as being a well-defined, navigable channel for some distance up from its mout . From what I could see of the Archer whilst traversing it in 1884, this could not very well be the case.

Most of the country embraced between the navigable portions of these rivers is of an inferior quality, consisting of gravelly and sandy forest ridges, timbered with bloodwood, messmate, ironwood, gum, and tea-tree. From what you might call the head of navigation on the rivers, the country, although not of first quality, is, in my opinion, well suited for agriculture, consisting of undulating open forest of box, gum, bloodwood, and ironbark, with patches of tea-tree sandy forest. The soil on what is known locally as ironstone ridges, is of a red, loamy description (from the decomposed conglomerate), with a depth in places of 5 feet. Tropical fruits, &c., thrive remarkably well on this soil, and it is, I think, better suited for agriculture than the richer looking dark brown soil on the melon-hole country, which is of a friable, porous nature on the surface, with a stiff, clayey subsoil. I cannot form a decided opinion as to the origin of the soil which forms the melon-hole country. There are a few outliers of dark brown sandstone ; in the central parts occur whitish nodules about the surface, containing a large amount of lime ; whilst in the bed of some of the creeks are to be seen exposed surfaces of a whitish brown formation of rock of a soft, rounded nature, and apparently a mixture of lime and sand (the depth of soil showing in the creeks is from 8 to 12 feet.) In one creek near Mein Telegraph Station a section of fine bluish rotten slate is exposed, whilst within a few miles of it stones of a flaggy nature are to be seen, but this is approaching a part of the Geikie Range ; whilst a few miles to the south of the Lukin River, which is the southern extremity of this description of country, there are outcropping a few clusters of granite rock. These, however, are not very distant from the boundary. The soil at all these places is of similar description in appearance, and it is not improbably due, to some extent, to metamorphic action.

The area over which this melon-hole country is interspersed—it occurs in frequent patches, the intervening areas being principally pebbly ironstone country—commences about lat. 12deg. 30min., long. 142deg. 20min., thence in a south-south-east direction to about lat. 14deg. 30min., long. 143deg., with an average width along the central part of about 30 miles. The only grazing settlement that has taken place is on this area. The soil is thickly grassed, retains moisture well, is lightly timbered with a kind of willowy gum, and in parts box. The creeks hold water well, and generally have fine permanent lagoons along their banks.

The country to the south of this, and extending to the Palmer and Mitchell rivers, is very inferior, of a sandy character throughout, being chiefly a desert sandstone formation; mostly open forest of bloodwood, ironwood, and tea-tree, with messmate, black wattle, and quinine. There are patches of grassed country along the creeks and rivers, but limited in extent; sufficient, however, to answer the purposes of droving. This unoccupied country is about 15,000 square miles in extent, and sustains a fairly large number of natives, particularly along the coast, which, I suppose, is the only part of Queensland where the natives have not come into contact with whites. To the north of it is simply sandy desert to within a few miles of Cape York, what natives there are being simply along the coast.

The rainfall in these parts is fairly heavy, and, combined with a very regular and not too severe tropical climate, various tropical productions would no doubt do well.

I have been on the coast in various places north of the Mitchell River, and invariably found when approaching the coast raised beaches of sand and shells, running parallel with the coast, and distant perhaps a quarter of a mile from each other, apparently showing a gradual rising in this part of the coast.

It may be well here to state, in connection with the so-called "new rivers," that the creeks forming their heads have been known since 1864, and a portion of their tidal waterways were delineated on my maps of the district in 1885. It should have been stated that the Rev. Mr. Hey ascertained and navigated their mouths, the positions of which were, however, shewn on the Admiralty charts.

This particular part contains a great many natives, and an additional missionary station is about to be formed there. As I am in a position to speak from experience regarding the condition of the natives before the establishment of Mapoon Mission Station and their present condition. I am pleased to be able to say that the improved change in the young natives is very marked, and shows the result of patient work and kindness on the part of good Christian people.

Anniversary Address to the Royal Geographical Society of Australasia, Brisbane.*

By the President, J. P. Thomson, F.R.S.G.S.,

Corresponding Member of the New York Academy of Sciences, etc.

For the third, at present last, time I have the privilege of delivering an address as President of this Society. It has been a very great pleasure for me to preside over the meetings of our Council and of our members during the past three years, and my warm thanks are due to everyone connected with the Society for loyal support and stimulating encouragement. During my tenure of office, our institution has, I am happy to say, increased in strength, and, I hope, in usefulness as well; whilst there has been, I rejoice to find, no apparent diminution of our usual activity. These very happy results have been brought about, as you are no doubt aware, by the hearty co-operation of the officers, Council and members, who have contributed in no small measure to our successful work. The record of this work up to the end of last session has been very clearly put before you in the excellent historical review read at the last annual meeting by my esteemed colleague the Vice-President. In this short address it would be an unprofitable task for me to attempt to add anything to that admirable paper, and I have therefore decided to offer a few remarks upon another subject, in which, I daresay, you are a little interested.

Before doing so, I must, however, pay a slight tribute of respect to the immortal memory of a fellow-worker, whose great labours in our own department of human knowledge have forever ceased. My distinguished colleague and revered friend, the late Baron Sir Ferdinand Von Mueller, has passed away; and we, in common with other kindred institutions throughout the world, mourn an irreparable loss. It is indeed sad to contemplate the uncertainty of life's constant struggle in this

* Delivered at the Anniversary Meeting, July 29, 1897.

vast terrestrial theatre of human intellectual enterprise, where the many brilliant achievements of accomplished actors command our respect and admiration, and where refreshing draughts from the great fountain of knowledge, "now no longer sealed," are free to all. Little need be said by me of the stupendous labour performed by this illustrious servant of science, whose loss we now deplore. Societies, or even individuals, may find some fitting memorial to his honoured name, but no greater monument can possibly be erected to the memory of the late Baron Von Mueller than the imperishable one which he has raised by his own hands. It is not for me to attempt to add anything to the many excellent accounts already given, by fellow-workers, of the late Baron's botanical investigations. My chief concern here is to offer a few remarks upon his contributions to geographical science. In these young and rapidly rising colonies there are really comparatively few men who devote their best energies to the cause of human knowledge, and who love knowledge for its own sake rather than for any material considerations which it very seldom brings. Baron Von Mueller was, however, one of these very few, and his greatness lay within himself. Admittedly one of the most distinguished scientific worthies of the century, he was indeed the accomplished architect of his own fame, which will always live in the historical archives of scientific progress. For several years this great man had been very closely identified with the excellent work of the Victorian branch of our Royal Geographical Society of Australasia, having indeed occupied the position of President of that well-known body from its very inception till the day of his death. His indomitable energy was indeed remarkable, and his keen interest in geographical research undiminished up till the end of his long and honourable career. Baron Von Mueller may be said to have distinguished himself in the field of Australian exploration and discovery at the very commencement of life in this country. His first experience as an explorer was acquired in the Australian Alps where he started to investigate the flora of that interesting region, and to lay the foundation of one of the grandest botanical monuments of the century. He next identified himself with the work of exploration when associated with my distinguished predecessor in the chair of this Society (Hon. A. C. Gregory) on the North Austra-

lian Expedition in 1855. He maintained an undiminished interest in the mysterious fate of the unfortunate Dr. Ludwig Leichhardt, and persisted to the very last in using every possible effort to obtain some slight clue of that ill-fated Leichhardt expedition. He was the principal moving spirit in organising the Elder Scientific Exploring Expedition to Central Australia in 1891-92, and it was chiefly due to his influence that the late Sir Thomas Elder gave the necessary funds to cover the entire cost of the enterprise. He was one of the most active and consistent promoters of exploration in Australasia and adjacent regions, and for many years his name has been indissolubly associated in some way or other with almost every movement of the kind in the Southern Hemisphere. He was chiefly instrumental in procuring funds to defray the cost of the Victorian Branch of our Society's expeditions to explore Mount Kina Balu, in British North Borneo, and Mount Obree and Mount Yule, British New Guinea. His sympathies were wide and deep in everything concerning the welfare of our own department of human knowledge, and in the progress of exploration and discovery he took a lively and practical interest. For many years he was most active in furthering the interests of Antarctic exploration, and indefatigable in endeavouring to procure funds to defray the cost of an expedition to that unexplored portion of the globe. It is much to be regretted that Baron Von Mueller should have passed away before the accomplishment of that great geographical work which awaits the enlightened enterprise of geographers in the vast Southern Continent. As a man, this scientific worthy possessed many rare and endearing qualities. To fellow-workers in this country he was a warm and consistent friend, always interested in their welfare and not infrequently contributing from his own slender resources to their material wants. Alas! he has gone, and we already miss him here; but his name will always be remembered with affectionate feelings of respect for his great works and noble qualities.

British New Guinea.

Since our last anniversary gathering, a great deal of public attention has been bestowed upon our next door neighbour, and the probable mineral wealth that lies hidden in the neighbourhood of the lofty and rugged Owen Stanley Range there. Our knowledge of the geography of British New Guinea has increased

very greatly since the date on which it became part of the Empire. Except in the far western interior the country has, in point of fact, been traversed throughout, and the principal physical features have been very fully elucidated. Of the general geological structure, we now have a fairly clear and accurate conception, and recent investigations have thrown a gleam of light upon the probable mineral resources of the territory. The vegetation, too, has been forced to reveal much of its interesting character to the searching eyes of the enthusiastic traveller, in journeying through the forest-clad regions of this Papuan land. The soils have been examined, and their productive quality fully tested by recognised scientific method. The faunal wealth of the Possession has also received much praiseworthy attention, and an abundant harvest has amply rewarded enlightened effort in this department of human knowledge. The peaceful conquests achieved in the field of exploration and discovery are scarcely more remarkable than the successful establishment of civil government, and the subjugation as well as the amelioration of the condition of the native people of the country. The further establishment of christianising institutions in the coastal regions of the Possession has brought about a very marked improvement in the native social life. The ramifications of these, it is true, have yet to be extended to the far-off tribes of the interior, but this is a matter that will no doubt receive full attention as settlement progresses. Our ethnological knowledge has at the same time been greatly increased by the far-reaching investigations conducted during the rapid movements of administration. The administrative period under review has been one of sustained activity, and the results achieved command admiration and respect from all. The native policy itself is a model of simplicity and effectiveness, and its operations have been extended to many parts with most gratifying results. There is probably no other measure of the kind in any country for the proper regulation of native affairs that is so beneficial in its incidence and far reaching in effect. In the colony of Fiji, where the same policy has been in operation for over a quarter of a century, the general condition of the natives is quite equal to the European standard, and there is no danger whatever of an extinction of the race by close contact with the superior one. This I apprehend will be the actual

future condition of the Papuan, if nothing be permitted to interfere with the existing plan of administration. In the nature of things the results of this wise administration are cumulative, and will only be fully realised in time to come. The foundations of these social and political institutions have been laid by the hands of the present able and humane Administrator, who has rendered signal service to the Empire and to humanity during his long and successful career in our neighbouring country to the north. There are perhaps very few countries where exploration is more formidably impeded by physical and climatic conditions than in British New Guinea. Mountains are everywhere piled upon mountains: great and rugged ranges, cleft by deep impassable gorges, distort the surface: whilst difficult and treacherous torrential streams traverse it in all directions. The vegetation, too, is of the densest and most luxuriant description, and so repellent that it can only be penetrated with the greatest possible difficulty. Yet, in the face of these combined obstacles, the energies of a small band of workers under the guidance of a great leader have triumphantly subdued nature and won the country for our peaceful occupation.

From east to west the territory is traversed by a lofty forest-clad range, except in precipitous places, where the rocks have been laid bare by the process of denudation. The anticlinal axis of this mighty range, that culminates in Mounts Victoria and Albert Edward, separates the northern and southern waters of the Possession. From this great dividing range, that probably extends right to and connects with the lofty Charles Louis chain in the Dutch territory, there radiate many lateral mountain masses—both high, rugged, and precipitous. In some parts there are detached ranges and mountains apparently belonging to no particular system, and these great elevations are tossed about in wild confusion. The waters of the Alpine regions, so copiously supplied with an abundant tropical rainfall, are drained by numerous streams that flow to the north-east and to the south. The largest of all is the Fly River, with its extensive system of tributary streams, that drain the south-western waters into the Papuan Gulf. There is also the Aird River system that traverses the Gulf region east of the Fly, and many other important streams still farther to the east. The northern, or more correctly

speaking, the north-eastern, watershed is drained by several small and very rapid rivers, the longest of all being probably the Mambare, in the basin of which the recently discovered mineral areas exist. This stream takes its rise in the immediate neighbourhood of Mount Victoria on the northern face of the Owen Stanley Range. It is interesting, not only on account of the alluvial gold found in the channel and tributary streams, but from its nearness to the national boundary between the British and German possessions. Indeed it was at one time thought that the mouth of the Mambare lay wholly within the German territory until Sir William MacGregor's correct determination of the boundary line placed it inside of the British possession. Most of the other streams along the north-east coast are very short and torrential, and of little value as commercial highways to the interior. The alluvial lands and extensive plains are chiefly in the south-western portion of the Possession, especially in the great valley of the Fly River and neighbourhood. For the most part, the country is clothed with forest and an obstructive undergrowth of dense vegetation. The streams are numerous, and extensive swamps are common enough in the low-lying regions of the west. In favourable localities the soils are exceedingly rich and fertile, and the cultivated lands yield abundantly.

The geological structure of the country has not yet been fully investigated. There are, however, several interesting points of the bold outline or surface features that have been very fairly elucidated. In the main, we are chiefly indebted to Mr. A. Gibb Maitland for our geological knowledge of the British Territory in New Guinea. It was he who, while an officer of the Geological Survey of Queensland, published a valuable report in which his observations of the geology of our Papuan Possession were recorded. That Australia and New Guinea were at one time united there seems to be no reasonable doubt whatever. Even now, they are only separated by a very shallow strait, abounding in reefs and sandbanks that are barely under water. The navigable channels are narrow, and no deep troughs exist within the limits of Torres Strait. The rock structures, the vegetation, and many faunal types of New Guinea find a counterpart on the Australian Continent. Evidence is in fact everywhere present of a former union between both countries. The submarine-bank,

upon which New Guinea rests, extends far and away to the archipelagoes of New Britain, the Solomons, Santa Cruz, New Hebrides, and Fiji, and it is clearly defined by the circumscribing contour line of 2,000 fathoms. In the main mountain ranges of the British portion of New Guinea the crystalline rocks are largely developed. Most of these occur in the igneous and metamorphic state, but there are others in which the clastic nature is not yet revealed by alteration. The sedimentary rocks are covered by fossiliferous beds of the Tertiary age, and these deposits are mostly developed along a vertical plane. The Tertiary deposits are succeeded by a series of coral beds, ranging from high-water mark to some 2,000 feet above sea level. Volcanic rocks of recent age are largely developed, especially along the north-east coast of the Possession and adjacent islands. Hot springs are numerous enough in the D'Entrecasteaux Group, and the volcanic fires of Mount Victory, on the mainland, are sufficient to show that the old subterranean forces are not yet quiescent. Our knowledge of the geological structure of the numerous raised reefs or coral islands north-east from New Guinea is at present very limited, but there is little doubt that these occupy the summits of submerged mountain ranges. The mineral deposits and metalliferous rocks of the country have not yet been systematically examined. Their existence, however, has been often enough attested by the wide explorations of the present Lieutenant-Governor, as well as by the numerous pioneer prospectors who have visited the country during recent years. Alluvial gold has been obtained on several of the numerous islands of the eastern division, and more recently on the Mambare River and other streams along the north-eastern coast. Auriferous gold is known to exist on the island of Sudest, and during his recent journey across the mainland Sir William MacGregor had an opportunity of examining Mount Scratchley, which he believed to be probably auriferous also. Although little attention has as yet been given to the possible mineral wealth of the central and western divisions, it seems to me that alluvial gold ought to exist in the basin of the Fly and other streams in the neighbourhood of the Papuan Gulf. The difficulties of access to the upper valleys of these streams are greatly against the gold prospector, but as exploration and settlement advance, these will in time be

overcome and the proper examination of the regions rendered possible. It was certainly the opinion of the late C. F. Wilkinson, Government Geologist of New South Wales, that gold would be found in the watershed of the Strickland and other Gulf streams. Evidence in support of this view was afforded by an examination of the rock specimens obtained by the "Bonito" Expedition to the Fly River and the alluvial drift from the bed of the Gulf streams. Whether or not gold will be discovered in payable quantities in this part of the Possession remains to be seen. There is certainly an enormous scope for investigation in the direction here indicated. The territory is a virgin field to the prospector, and great mineral wealth may probably lie awaiting discovery. The whole country is, as a matter of fact, unexamined in so far as the rocks and soils are concerned. The work is most extensive, and many years must necessarily elapse before it is fully accomplished.

In the meantime the blank spaces on the map of the country are being rapidly filled in; there is great activity in the field of exploration, and the physical features of the territory are being carefully examined and delineated. The recently discovered auriferous rocks of Mount Scratchley and the alluvial gold of the Mambare system have brought our Papuan Possession more prominently before the Australian public than heretofore. Miners from almost every part have eagerly sought for information concerning the so-called goldfields, whilst many have actually visited them. Naturally enough the failures and bitter disappointments experienced by these pioneer gold-seekers have been more frequently reported than the successes. Otherwise could not have been expected. Men are lured by the prospect of gain, and tempted by the love of gold, to penetrate the unknown; they rush to a new country where the physical conditions, the climate, and vegetation combine to oppose the forward march of the invader, and the native inhabitants have also to be reckoned with. The interior has not yet been pierced by the highways of commerce, and to the inexperienced miner of slender resources travelling is both dangerous and difficult. Still, men will face death rather than relinquish the quest for gold, and in this way it often enough happens that many useful lives are lost to the country. This is only what happened in the early digging days of Australia, and

what is actually happening now in many of the little known portions of our continent. It seems to be the irony of an inflexible law of nature that the absolute conquest of a country must be preceded by the death tribute, to which man becomes the victim of an inordinate lust of gain. Water in New Guinea is plentiful enough, and no one need perish from thirst, whilst the luxuriant tropical vegetation furnishes a variety of esculent tubers and roots.

One of the most remarkable features of British rule in New Guinea is that which indissolubly associates Sir William MacGregor with the examination of the country. In no other part of the British Empire has exploration been more successfully and persistently carried on during the past seven or eight years. The difficult task of crossing the island from north to south has been successfully accomplished during last year by the indefatigable Lieutenant-Governor, who at the same time also reascended Mount Victoria and renewed acquaintance with the alpine flora of the Owen Stanley Range. On this occasion the unfortunate condition of the weather rendered extensive instrumental and other observations impracticable. The prevailing fogs or mists in which this highland region is so often shrouded, shut out all the leading physical features of the neighbourhood from view, and Sir William was obliged to leave without adding very much to his previous knowledge of the physiography of the locality. Still, the additional experience gained will be of great value in future journeys across the country, whilst the practicability of traversing the loftiest features of the territory has been further demonstrated. There is little doubt that for some time to come the sea will form the great highway in New Guinea. It is not an easy matter to open up direct communication to the interior of a country whose surface features are exceedingly rugged and broken. Routes have to be carefully chosen after much laborious search, and the task is rendered all the more difficult and obstructive by the density of vegetation that is everywhere met with.

Of the possibilities of New Guinea, a good deal may be said. Enough is already known of the country to justify the prediction of a great future in store for it. It is no doubt difficult to give anything like a faithful forecast of the potentialities of the Possession. Still, it may be fairly assumed that in addition to the

undoubted mineral resources, the tropical agricultural industrial aspects are particularly good. Vast areas of rich alluvial lands in the central and western districts of the country will no doubt in time be rendered available for sugar growing—an industry to which the climate is eminently favourable. The sugarcane at present grows wild in several parts of the country, and many varieties of the plant are met with in localities where proper cultivation is all that is needed to aid in its development and render the industry remuneratively productive. For tropical agriculture the Possession offers many advantages that will no doubt be rendered accessible and made widely known during the progress of settlement. The question of labour is one with which settlers will not have to grapple for many years to come. There is a large native population, and the people are already giving evidence of improvement under the beneficial influence of British occupation. They are beginning to see the marked contrast between a desultory, aimless life, and one in which the social affairs of a community are regulated by thrift and methods calculated to improve the physical and intellectual attributes of man. Progress in bringing about any desirable change in this direction must necessarily be slow, and in many respects tedious, for the chief aim should be to render the transition gradual, rather than rapid, if any lasting benefit is to be derived from it. Now, this is precisely what the existing native policy anticipates. It seeks to impose upon the original inhabitants of the country conformity with the essential canons of British Government, whilst in no way depriving them of the enjoyment of inherited rights and social usages. The system is natural, equitable and just, and its success already assured in British New Guinea. Our conquest of the country has happily been peaceful, and whatever the future may be, let us avoid reproach in dealing with the aboriginal inhabitants. Our experience with the Australian blacks has no doubt taught us a useful lesson; let us profit by it in opening up and settling our recently acquired territory. The cost of administration is small, and not commensurate to the value and importance of the Possession. The position is a commanding one, and apart altogether from the natural resources of the country, it is of immense value to the Empire. It is, in point of geographical and commercial importance, the key to the great oceanic trade routes

to Asia and the enormous eastern archipelago. It is impossible to conceive any probable limit to the future commercial possibilities of the territory. The mineral resources alone, to which I have already alluded, are probably inexhaustible. Apart from the metalliferous areas that are known to exist in some of the partially explored coastal regions, there has been discovered some samples of excellent coal in the basin of the Purari River that flows into the Papuan Gulf. This may lead to the further discovery of a fully developed coal-bed, which would no doubt have an important bearing upon the future development of the latent resources of the country. The climate, as a matter of fact, is not inimical to the health of the ordinary British settler. The temperature varies from the tropical heat of the low lands to the temperate alpine regions of the interior. The swampy coastal lands of the western portion of the country are probably less favourable for settlement than in localities where ample drainage exists, and malarial disorders are not uncommon there; but then this is precisely one of the conditions common enough to some parts of tropical Australia, and no exception need be taken on this score to the climate of British New Guinea. The same kind of fever is common to Java, Sumatra, Borneo, and most of the numerous islands in the eastern archipelago, where settlement has long been established, and where large communities of various nationalities live in the enjoyment of very good health under climatic conditions that are in no respect superior to those obtaining in British New Guinea. This is really a subject requiring impartial consideration and treatment. The hasty opinions of a floating mining community, or of the ordinary traveller, are of no practical value whatever; they are, in point of fact, entirely misleading in most cases. The conditions of ordinary life are essentially different from, say, those of Australia, and immunity from local disorders inimical to health can only be obtained in New Guinea or elsewhere by proper acclimatisation and attention to tropical hygeian. It should be borne in mind that many men are naturally not physically constituted for life in a tropical climate, and there are others whose impaired constitutions render choice of climate essential. In both cases the Papuan climate will most likely be injurious.

PROCEEDINGS

OF THE

Royal Geographical Society of Australasia,

BRISBANE.

TWELFTH SESSION.

AUGUST 31, 1896.

The President, Mr. J. P. Thomson, F.R.S.G.S., etc., in the chair.

There was a large attendance of ladies and gentlemen, members and their friends, and visitors from other colonies.

The minutes of the previous Annual Meeting were read and confirmed.

The following new members were elected :—The Hon. Sir Hugh M. Nelson, K.C.M.G., Messrs. C. W. de Vis, Curator of the Queensland Museum, and William Street.

Diplomas of Ordinary Fellowship were awarded to Messrs. J. A. Baxendell, William Jones, and James Irving, M.R.C.V.S.L., etc. Mr. R. H. Mathews, L S., of Parramatta, N.S.W., was elected an honorary corresponding member of the Society.

The President read an interesting letter from the late Baron Sir Ferdinand von Muller on the subject of Nansen's attempt to reach the North Pole.

The Hon. Librarian presented the eleventh volume of the "Proceedings and Transactions" of the Society, which was now published and available for distribution.

On the motion of the Vice-President, seconded by the Hon. Treasurer, a vote of thanks was unanimously accorded the President for having edited the publications of the Society.

The Vice-President, Mr. A. Muir, then read an interesting paper by Mr. W. Bertrand Roberts, entitled "Notes on Mining Life and General Features of Pahang, Malay Peninsula." (See p. 1.) The paper was illustrated by numerous photographs of life and scenery in that country, and was the subject of much discussion amongst members.

The Hon. Librarian presented a large number of books, pamphlets and maps received since the last meeting.

SEPTEMBER 28, 1896.

The President, Mr. J. P. Thomson, F.R.S.G.S., etc., in the chair

The minutes of the previous meeting were read and confirmed.

The Rev. Dr. Frackelton was elected a member of the Society.

Mr. Jas. Irving read a paper by Alfred T. Story on the subject of M. Andrée's attempt to reach the North Pole by balloon. The paper, which was published in the "Strand Magazine," and illustrated, gave rise to some discussion.

A second paper was then read by Mr. R. M. Collins, M.L.A., on "A Trip to the South-eastern Highlands of Queensland." (See p. 20.) Many members who had visited this magnificent portion of the colony took part in the succeeding discussion.

OCTOBER 20, 1896.

The PRESIDENT, Mr. J. P. Thomson, F.R.S.G.S., etc., in the chair.

The minutes of the previous meeting were read and confirmed.

Messrs. R. Fraser, M.L.A., and J. T. Embley, L.S., were elected members of the Society.

The President, after apologising for the absence of the Hon. A. C. Gregory, delivered a feeling oration on the loss sustained by the scientific world, and by the Victorian Branch of the Society in particular, by the death of the late Baron Sir Ferdinand von Mueller.

The Hon. Secretary and Mr. J. Fenwick also paid a tribute to the memory of the deceased scientist.

A resolution that a letter of sympathy be addressed to the Victorian Branch was passed in silence, members standing to denote their respect for the late Baron.

The Hon. Secretary then read Mr. Embley's paper on "The Western Watershed of the Upper Portions of the Cape York Peninsula." (See p. 26).

The President, the Hon. Secretary, and Mr. J. Fenwick led the discussion on various points connected with the nature of the country and its capabilities for settlement.

The President then exhibited a unique and valuable collection of weapons, domestic utensils, clothing, &c., from the South Sea Islands and from New Guinea. Each exhibit was clearly explained, and great interest was shown in the articles, many of which were now seen for the first time in Australia.

The meeting closed with a vote of thanks to the President for the trouble he had taken in bringing forward this most interesting exhibit.

OCTOBER 30, 1896.

The PRESIDENT, Mr. J. P. Thomson, F.R.S.G.S., etc., in the chair.

This was a special general meeting held to consider an important telegram from His Excellency the Lieutenant-Governor of British New Guinea, a copy of which had been forwarded to the President by the Prime Minister of Queensland.

The following communication was read by the President :—

SIR WM. MACGREGOR'S RECENT JOURNEY ACROSS NEW GUINEA AND RE-ASCENT OF MT. VICTORIA.

By the courtesy of the Prime Minister of Queensland, Sir Hugh M. Nelson, I have been favoured with a copy of the following telegram received a few days ago by His Excellency the Governor of Queensland from His Excellency the Administrator of British New Guinea :—

"Without loss of life or limb have crossed New Guinea from mouth of Mambare to mouth of Vanapa. Followed Mambare to foot of Mt. Scratchley where river divides to embrace the mountain. Ascended Mt. Scratchley, on top of which observed with small theodolite. Found easy road west of Stanley Range. Without descending re-ascended Mount Victoria to observe, but weather unfavourable. Descended Mount Knutsford and found a not-difficult road to coast. The miners have been at work at foot of Scratchley, probably the whole of which is auriferous. Wharton chain connects Mount Scratchley with the Great Mount Albert Edward, which is also well inside British territory. All these great mountains seem composed of slate and quartz. No natives between Government station and Mount Scratchley. On the latter is very friendly tribe. Excellent relations with natives from Mount Knutsford to the coast. Had scarcely a single completely dry day. I strongly dissuade any travelling towards the interior before April or May. Native carriers will not be permitted to proceed inland with Government sanction before then, when all possible facilities will be given to prospectors during the dry season.

"(Signed) WM. MACGREGOR."

In view of the important bearing of this successful journey upon the opening up and probable future of British New Guinea, I thought it might be of some interest to offer a few brief remarks on the geographical condition of the country between the Mambare and Vanapa rivers, along the overland route now traversed for the first time by the Lieutenant-Governor.

It is well known that in 1889 Sir William MacGregor, who at that time had but very limited resources at his command, successfully accomplished the ascent of the Owen Stanley Range to its highest summit, which he named Mount Victoria.

In the course of my official duties, the work of compiling the map illustrating the Administrator's route on that occasion devolved chiefly upon myself, and I am consequently in the main morally responsible for the correct delineation of all the features upon it, although this does not appear on the face of the map itself. At the same time, I had the privilege of being the first to deal with, examine, and make public, the geographical results of that famous journey, in a paper read, in Sir Wm. MacGregor's presence, at a meeting of the Royal Geographical Society of Australasia, Brisbane, on September 2, 1889. I merely mention this to show that I have an intimate knowledge of every detail connected with the work and results of the expedition in question, and am fully prepared to enter into all the particulars of it, even more fully than I have done on a previous occasion or in my work on "British New Guinea." These remarks are rendered

necessary in view of the persistent statements concerning this expedition in particular, and our geographical knowledge of the country in general by one of Sir Wm. MacGregor's predecessors in the field of exploration.

For many years before the arrival of Sir Wm. MacGregor in New Guinea, several attempts had been made to explore the Alpine region of the Owen Stanley Range. For various reasons no one had been able to accomplish it. These attempts—by Captain Armit, Messrs. Chalmers, Goldie, Morrison, Hartman, Hunter, Cuthbertson, and Forbes—resulted in signal failure, neither of the explorers reaching even the foot of the great range. In a letter published in the Proceedings of the Royal Geographical Society, London, September, 1890, Mr. H. O. Forbes stated that his "nearest approach to Mount Victoria, by my own map, is between eight and nine miles," and that it was only necessary for him to descend to and cross the Warume River below him to obtain access to several leading spurs leading directly to the summit of Mount Victoria. He believed that the road traced by his eye from the hills in the Sogeri region on his first arrival in New Guinea was more eminently feasible than the one followed by Sir Wm. MacGregor in the latter's journey to the summit of Mount Victoria. Against this statement it may be pointed out that there seems no doubt whatever that Mr. Forbes did not see the highest crest of the mountain from his nearest approach to it, and it is almost certain that he could not have obtained access to the crown of Mount Victoria along the south-easterly spur of it. Concerning this accessible spur which Mr. Forbes purposed ascending, Sir Wm. MacGregor says, it is a mighty precipitous buttress exceeding 12,000ft. in height, "bristling with peaks and pinnacle-like rocks, and contains hundreds of inaccessible crags and precipices."

Sir Wm. MacGregor's first route, in 1889, lay for some distance up and along the Vanapa River, and apparently he has followed his old track very closely from the crown of the Owen Stanley Range to the south coast in his recent journey across New Guinea. The important bearing which the successful accomplishment of this arduous journey must necessarily have upon the development of the country will be fully apparent to all who have watched the progress of British enterprise in the Possession since its establishment some ten years ago. Apart from the increase to our knowledge of the geographical conditions of the interior of the south-eastern portion of the Island itself—an increase that cannot fail to be of the very greatest interest and importance—the advantage of having a practicable route across any portion of the British territory is one that can scarcely be overestimated. It is almost impossible to give an accurate forecast of its bearing upon the opening up and settlement of the country and the development of its probable mineral resources. That valuable minerals occur in the high ranges of the interior has been clearly enough shown by the alluvial gold obtained in the upper reaches of the Mambare River and the auriferous character of Mount Scratchley, to which special mention is made in Sir Wm. MacGregor's telegraphic message to the Governor of Queensland. There is little doubt, too, that mineral deposits will probably be found on the southern slopes or near the base of the Owen Stanley Range, and this region will, it is hoped, soon be rendered accessible along the overland track that will doubtless be shortly opened up.

The Mambare River—the Clyde of the Admiralty charts—debouches into Traitor's Bay on the north-east coast of the Possession. The mouth of this interesting river is only about two miles within the British side of the Anglo-German boundary, on the 8th parallel. It is navigable for an ordinary-sized steam launch for about forty miles up, and on the lower reaches are extensive areas of good alluvial land, interspersed with remarkably fine fields of sago palms. The district is famous for its very lofty forest trees and fine climate. The river was explored for the first time by Sir Wm. MacGregor in 1894, and recently he again ascended it on his journey across the Island. There is no doubt but that it affords access for some distance at least to the mineral areas of the interior, and especially to the bracing highland zones of the Owen Stanley Range, Mount Albert Edward, Mount Scratchley, and other neighbouring ranges that were hitherto regarded as inaccessible. It forms a section of the overland route followed by the Lieutenant-Governor, and it is almost certain that the Mambare district will ere long become an important one.

Excellent relations have been established with the natives of the interior, and indeed all the way across the Island the natives met with have been very friendly, a prevailing condition that cannot fail to have an important bearing upon the future development of the country by British enterprise.

Not the least important geographical results of Sir Wm. MacGregor's recent journey is the discovery of a connecting chain between Mount Albert Edward and Mount Scratchley, and the practicability of ascending the Owen Stanley Range to its highest summit on Mount Victoria from the north-east as well as from the opposite side.

J. P. THOMSON.

Brisbane, October 30, 1896.

The President's remarks were illustrated by a large map and charts.

Mr. Thomson's communication to this Society was published in *Nature*—a widely-known British journal of science—of December 17, 1896 (Vol LV., p. 157). In a subsequent issue of that publication there appeared a letter by Dr. Henry O. Forbes, referring to Sir William MacGregor's journey across British New Guinea, and to the President's observations thereon. To this letter Mr. Thomson had replied. The subject was considered by the Council of this Society at a meeting held on July 6, 1897, when it was resolved to publish the whole of the correspondence for the information of the members and of geographers as well. The following correspondence, in addition to the preceding, is now published accordingly :—

Dr. Henry O. Forbes's letter to *Nature* of January 14, 1897, p. 247 :—

SIR WILLIAM MACGREGOR'S JOURNEY ACROSS NEW GUINEA.

In *Nature* of December 17, p. 157, you publish an article describing Sir William MacGregor's interesting journey across the South-eastern Peninsula of New Guinea, by Mr. J. Thomson. As he has introduced some reference to my work in the Possession, perhaps you will kindly allow me space for a few observations. The names of seven travellers, besides my own, are mentioned whose attempts "to explore the Alpine region of the Owen Stanley Range" have "resulted in signal failure." More than one of us, however, *did* reach

the Alpine regions of the range, though none of us ascended Mount Owen Stanley. And I cannot think that any of those who made the attempt will feel any discredit attaching to them on that account, any more than attaches to Sir William MacGregor that he could not reach the mountains beyond the sources of the Fly River. That Sir William was the first to scale Mount Owen Stanley is true, and he deserves all the *kudos* he has received for his exploit. Yet the success which attended his efforts was in no small measure due to the information gathered by his forerunners, and even by their "signal failures." Each traveller made it easier for his successor; and Sir William mounted on the backs of all who had preceded him, however much the historiographer for New Guinea may try to ignore their efforts. The reason why some of us who made a not ill-considered effort at great personal expense to reach the summit of the Mount, failed in accomplishing all we desired, was chiefly one of money. Sir William, who has the resources, the steamers and the launches of the Possession, at his back, and has besides the prestige of "Great Chief" over the natives—no mean factor in the exploration of such a country—and can call upon his officials in all quarters for aid, is in a different position from a private traveller dependent very largely (I speak for myself) on his own resources, and *ought* to accomplish far more than any other traveller.

Mr. Thomson goes on to say: "It may be pointed out that there seems no doubt that Mr. Forbes did not see the highest crest of the mountain from his nearest approach to it, and it is almost certain that he could not have obtained access to the crown of Mount Victoria [Mount Owen Stanley] along the south-eastern spur of it. Concerning this accessible spur, which Mr. Forbes proposed ascending, Sir William McGregor says, it is a mighty precipitous buttress, exceeding 12,000 feet in height, 'bristling with peaks and pinnacle-like rocks, and contains hundreds of inaccessible crags and precipices.'" Mr. Thomson's doubts about what I saw or did not see from my nearest approach to Mount Owen Stanley, are merely the expression of one having no personal knowledge of the country. But if Sir William MacGregor — for whose explorations I have the highest admiration—has said what Mr. Thomson puts into his lips at the close of the above extract, it is quite plain that he is not referring to the same feature that I have described. I took—and, if I mistake not, have published—a round of bearings upon "the highest crest," the most familiar object in my horizon for months. I approximately fixed the positions of and placed on my map names to these crags and peaks; but the Lieutenant-Governor, following a custom not infrequent with him in regard to the geographical nomenclature of his predecessors in this and other regions of New Guinea, has renamed them. The "accessible spur" mentioned by me, however, was not "a mighty precipitous buttress"—a feature, according to the description, one would think, not altogether unrecognisable as such—nor yet a Primrose Hill; but it was a negotiable slope all the same, and on a less incline then some others ascended by me in the same country.

In conclusion, I cannot help again drawing the attention of cartographers and geographers to the fact that Sir W. MacGregor, after all that has been expressed at the Royal Geographical Society, and publicly by many writers, on

the point, still claims for himself the honour of naming the chief mountain in the Possession, by persistently calling it Mount Victoria, instead of Mount Owen Stanley as it was christened nearly half a century ago by Huxley, and has been so inscribed on every map all those years. Prof. Huxley himself told me that the feature on which he bestowed the name Owen Stanley—in honour of as distinguished a commander and explorer as has ever sailed in those waters—was not the range, but the mountain, whose summit he saw rising clear above the clouds one early morning when the *Rattlesnake* was lying in Redscar Bay. Its position and altitude were then accurately determined.

HENRY O. FORBES.

The Museums, Liverpool, January 4, 1897.

MR. THOMSON'S REPLY.

Sir William MacGregor's Journey Across New Guinea.

You have published in *Nature*, January 14, 1897, p. 247, a letter bearing the signature of Dr. Henry O. Forbes. Your famous and impartial journal reached the rooms of the Royal Geographical Society of Australasia, Brisbane, at a time when, I regret to say, attention to urgent work compelled me to lay it aside for a while. The time that must necessarily elapse before a communication from this part of the world can reach your readers is, I think, very disadvantageous to correspondents here. It is not customary for me to reply to unfriendly communications upon controversial subjects. Under ordinary circumstances it is more charitable and often better for all concerned to pass them over in silence. On this occasion, however, I must depart from my usual practice, and, in the interests of the Government of British New Guinea, as well as in the interests of the history of exploration and discovery in this part of the British Empire, crave a little of your valuable space to enable me to say a few words in reply to the letter in question. The persistent hostility evinced by Dr. Forbes to the New Guinea Administration, particularly to one of the most peaceful and one of the ablest scientific explorers of the day, who at present is head of that Administration, is just as discreditable to the aggressor as it is harmless to the country. I shall therefore pass the subject over without further comment. But one of the worst features in your correspondent's letter is where he hastily charges Sir William MacGregor and myself with collusion, for it seems to me that no other inference can be drawn from his remarks. In quoting from my previous communication to *Nature*, he says :—" Mr. Thomson goes on to say : 'It may be pointed out that there seems no doubt that Mr. Forbes did not see the highest crest of the mountain from his nearest approach to it, and it is almost certain that he could not have obtained access to the crown of Mount Victoria [Mount Owen Stanley] along the south-eastern spur of it. Concerning this accessible spur, which Mr. Forbes purposed ascending, Sir William MacGregor says, it is a mighty precipitous buttress, exceeding 12,000ft. in height, 'bristling with peaks and pinnacle-like rocks, and contains hundreds of inaccessible crags and precipices.' " Mr. Thomson's doubts about what I saw or did not see from my

nearest approach to Mount Owen Stanley are merely the expression of one having no personal knowledge of the country. But if Sir William MacGregor —for whose explorations I have the highest admiration—*has said what Mr. Thomson puts into his lips at the close of the above extract*, it is quite plain that he is not referring to the same feature that I have described." The italics are my own. The words "bristling with peaks and pinnacle-like rocks, and contains hundreds of inaccessible crags and precipices" were not put into Sir William MacGregor's mouth by me. They are his own; they were used by the Lieutenant-Governor in his description of the south-eastern spur of Mount Victoria—the alleged "accessible" spur observed and described as such by Dr. Forbes, who says:—"Nor yet a Primrose Hill; but it was a negotiable slope all the same, and on a less incline than some others ascended by me in the same country"—and occur in his despatch (dated 1st July, 1889, p. 10) to the Governor of Queensland, in which the account of his famous journey to the summit of Mount Victoria is given. (See Proc. Roy. Geo. Soc., Lond., April, 1890, p. 215). Dr. Forbes, bear in mind, actually had—so he said—this very despatch before him at the time he wrote the communication that appeared in the *Proceedings* of the Royal Geographical Society, London, September, 1890, p. 558, and in which his description of the "negotiable slope" is recorded. To most sensible people it will no doubt seem that a seasoned reader would not have made such a blunder in describing a prominent geographical feature "the most familiar object in my horizon for months!"

"I took," says Dr. Forbes, "and, if I mistake not, have published—a round of bearings upon the highest crest of Mount Victoria the most familiar object in my horizon for months." A recent communication now before me, bearing a very familiar signature, says:—"We have all come to the conclusion that what Mr. Forbes described as Mount Victoria was Mount McIlwraith (a mountain some distance south-west of Mount Victoria, from which it is separated by a branch of the Vanapa River), to which his description is applicable, though quite unsuitable for Mount Victoria. He had, I presume, got the view of Mount Victoria cut off by Mount McIlwraith." This kind of blunder, I may just remark, is common enough to inexperienced observers in the field, especially in a country like New Guinea. In professional work cases of the kind have, as a matter of fact, frequently come under my own notice, involving great trouble, and in many instances loss of time, and money, and injury to the State. Concerning the value of Dr. Forbes's observations in New Guinea, I may at once and for all state, parenthetically, that I must respectfully and emphatically decline to join issue with him in the discussion of professional subjects. The instrumental equipment taken to New Guinea by Dr. Forbes was placed into my hands for professional inspection by his assistant, Mr. J. M. Hennessy, in Brisbane. After examinining them, and devoting a good deal of my time instructing Mr. Hennessy how to use the theodolite and otherwise assisting him in preparing for the journey, I very much regretted to find that, notwithstanding the repairs effected by the local optician, the instruments were unreliable for accurate work in the field of exploration. Their accidental immersion in salt water had greatly

damaged them. This, I consider, was a great misfortune indeed, and ought not to have occurred with proper care.

Dr. Forbes says:—"Each traveller made it easier for his successor; and Sir William mounted on the backs of all who had preceded him. . . The reason why some of us who made a not ill-considered effort at great personal expense to reach the summit of the Mount failed in accomplishing all we desired was chiefly one of money. Sir William, who has the resources, the steamers and the launches of the Possession at his back, and has besides the prestige of 'Great Chief' over the natives—no mean factor in the exploration of such a country—and can call upon his officials in all quarters for aid, is in a very different position from a private traveller dependent very largely (I speak for myself) on his own resources, and *ought* to accomplish far more than any other traveller." No traveller had preceded Sir William MacGregor along his route to the summit of Mount Victoria, the country traversed by the Administrator and staff being entirely unknown throughout. The cost of the journey, or, as it was modestly called by the leader, "Tour of Inspection," was a mere trifle compared with the considerable amount expended by Dr. Forbes whilst located amongst the coast hills at the back of Port Moresby, wrestling with the virgin forest on hill tops, and indulging in other harmless pastimes. It was not practicable for Sir William, and scarcely possible for even Mr. Forbes, to make use of "the steamers and the launches of the Possession" in the journey to the top of the great mountain range, even if the Government had at the time possessed them. "I had no means," said the Administrator, "except a whaleboat, of travelling anywhere by water." The Lieutenant-Governor's prestige of "Great Chief" had not then been established in the country; indeed, he had only been altogether about seven months in the Possession against the *two years* and some months that Dr. Forbes was there. In point of fact, Dr. Forbes, as an individual, was proportionally more liberally provided with funds and other means for carrying on work in New Guinea than the Administration of the country for the time being. The slender resources of the Possession were actually at his back, as a paid officer of the Government; and he was assisted in every possible way in attempting to explore the Owen Stanley Range. But what can be said of a man who, with a staff of twenty assistants, occupies *thirty full days* of valuable time in the field clearing the forest from the summit of a peak! "But," said Dr. Forbes, "before I could set up my instruments and fix its [peak] position, it required the labour of twenty men for thirty days to clear it of forest." (*Scottish Geographical Magazine*, 1888, p. 406.) It would be interesting to estimate the time required to cross New Guinea, or say Africa, at this rate of progress. Probably Mr. H. M. Stanley, or someone else with a good appetite for elaborate calculations, could enlighten us.

In conclusion, permit me to state that success in the field of exploration depends more upon the *man* than upon the "resources at his back," and in no country has this been more fully exemplified than in British New Guinea.

> "Time, Place, and Action," said Dryden, "may with pains be wrought,
> But genius must be born; and neve can be taugh

Dr. Forbes has blundered in attempting to describe a very prominent geographical feature that he had not personally examined, and concerning which his knowledge must necessarily be defective. The geographical conditions of the country have not yet been fully elucidated, and are consequently not wholly known to even geographers, who alone possess the necessary qualifications to deal with the subject in an authoritative and trustworthy manner.

Dr. Forbes will no doubt find his time more profitably occupied in his own special department of Natural History than in dabbling in geographical subjects, and he will likewise find a "Primrose Hill" more congenial than the wild and inhospitable mountain ranges of New Guinea.

J. P. THOMSON.

Brisbane, June 19, 1897.

NOVEMBER 20, 1896.

The PRESIDENT, Mr. J. P. Thomson, F.R.S.G.S., etc., in the chair.

The minutes of the previous meeting were read and confirmed.

Election.—Mr. H. G. Wickham.

The Ordinary Diploma of Fellowship was conferred upon Mr. C. Battersby.

The HON. SECRETARY drew attention to a complete set of the publications of the Natural History Society of Java, date from 1852, which had just been presented to the Society by that body.

He then read Mr. H. Burkitt's paper on "Copper Ore at Stanage Point." Captain W. C. Thomson, who was well acquainted with the Queensland coast, opened the discussion which became very animated, and elicited much valuable information about the possibilities of mining on the coast.

He also read the report of Professor Agassiz, on his late visit to the Barrier Reef. Captain Thomson, who had commanded the vessels conveying the expedition, gave a more detailed account of the explorations made, and of the work actually done.

The PRESIDENT said he was not inclined to attach much importance to Professor Agassiz's investigations, as he had only been engaged in the work for a little over two months, and during most of that time heavy weather had prevailed, necessitating the *Croydon* remaining in port. The work was merely tentative. Captain Leeper, R.N., who had for many years been in charge of the survey of the coast, gave a very instructive account of the Barrier Reef, of its openings, and of the currents to be found along its length. A vote of thanks was passed to him and to Captain Thomson for the valuable information they had supplied.

APRIL 9, 1897.

The PRESIDENT, Mr. J. P. Thomson, F.R.S.G.S., etc., in the chair.

The minutes of the previous meeting were read and confirmed.

Election.—The Hon. T. J. Byrnes, Attorney-General of Queensland, was unanimously elected a member of the Society.

The PRESIDENT gave an account of the work done by the Council during the recess. He stated that Mr. William Simpson, of New Guinea, had come to

Brisbane with credentials from Sir William MacGregor, and had at his (the President's) request written a short paper on "The Goldfields of New Guinea," which he then read.

Mr. R. Fraser, M.L.A., said the paper was a valuable one from a miner's point of view, and he was especially glad to have heard it, as he had considerable mining interests in New Guinea.

MAY 20, 1897.

The President, Mr. J. P. Thomson, F.R.S.G.S., etc., in the chair.

The minutes of the previous meeting were read and confirmed.

Mr. W. Yaldwyn, Police Magistrate, South Brisbane, was elected a member of the Society.

The Hon. Secretary explained that the Library had been catalogued by himself, and re-arranged by the President, so that every facility now existed for members to find any required book.

A short description of the "Giant Trees of Tasmania," by Mr. R. Atkinson, L.S., afforded scope for interesting details of large trees which had come under the notice of members in Australia and New Zealand.

At the request of the President, Mr. E. Gore-Jones read an exhaustive paper by Mr. R. H. Mathews on the "Initiation Ceremonies of the Wiranthuri Tribes." No discussion followed.

JUNE 8, 1897.

The President, Mr. J. P. Thomson, F.R.S.G.S., etc., in the chair.

The minutes of the previous meeting were read and confirmed. Special attention was directed by the Hon. Secretary to the splendid volumes presented by the United States Geological Survey Department.

Mr. C. C. Tommasi was duly elected a member of the Society.

The President gave a highly interesting impromptu address on the "Early Explorations of Australia," to illustrate several old charts which he laid on the table, commencing with the labours of Captain Cook in 1770, and going on to Flinders, Bass, and the Gregorys, concluding with the affecting narrative of the death of Kennedy in the Cape York Peninsula, and the devotion of his faithful black follower "Jacky Jacky." (A very full, but unfortunately inaccurate, *resumé* of this address has been published in the *Queenslander* of July 3, 1897. The proof slips were corrected by Mr. Thomson, but the sheets were printed off without the somewhat extensive corrections that were so greatly needed.)

The Hon. Secretary opened the discussion, which was carried on by several members who know the various parts of the West and North spoken of in the course of the lecture.

Mr. W. Street showed a very interesting sample of the destructive work of the Termites or White Ants. It also showed the insects in all their stages of development.

The President said this would be the last meeting before the annual gathering, when the present Council and Officers would retire.

ANNUAL GENERAL MEETING.

JULY 29, 1897.

The President, Mr. J. P. Thomson, F.R.S.G.S., etc., in the chair.

He was supported by His Excellency the Right Honourable Lord Lamington, Patron of the Society, the Hon. Augustus Charles Gregory, C.M.G., the Hon. Wm. Allan, M.L.C., the Vice-President (Mr. A. Muir), the Hon Treasurer (Mr. James Irving, M.R.C.V.S.L.), Mr. R. M. Collins, M.L.A., and other members of the Council.

There was a very large attendance of members and friends, including a great number of ladies. The room was packed in every part, and many were obliged to stand outside in the hall and on the veranda.

The minutes of the preceeding monthly meeting were taken as read and duly confirmed.

Apologies were read from several members of the Society and others who were unable to attend the meeting. Included in these was one from the Dowager Lady Lamington, who was unavoidably absent through the death of a near relative.

Mr. Charles Schaefer Rutlidge was elected a member of the Society.

On the invitation of the President, the Hon. Treasurer (Mr. James Irving), submitted the financial statement.

The following report was read by the Hon. Secretary, Major A. J. Boyd :—

Report of Council, Session 1896-97.

To the Members of the Royal Geographical Society of Australasia, Queensland.

Ladies and Gentleman,—Once more it becomes the pleasing duty of the Council of this Society to present the Annual Report of its operations during the session just brought to a close.

The report last year disclosed an exceptionally favorable state of affairs, both as to the financial position of the Society and also in regard to the numerical increase in membership. The Council have again the pleasure of announcing a very successful year, and note with satisfaction the increased interest taken in the special work of the Society by members who have contributed valuable and interesting papers for lecture at the ordinary monthly meetings of members.

Membership.—It is pleasing to note that of the 135 members on the roll at the close of last season, none have been removed, as was unhappily the case in 1895-6, by death ; thirteen new members have signed the roll, whilst only six have resigned.

Mr. R. H Mathews, of Parramatta, N. S. Wales, has been elected an Honorary Corresponding Member, whilst Ordinary Fellowships have been conferred on Messrs. James Irving, M.R.C.V.S.L., Hon. Treasurer of the Society, J. A. Baxendell, Head Master of the Downs Grammar School, Toowoomba, William Jones, Brisbane, and C. Battersby, of Georgetown.

His Excellency Lord Lamington, who kindly accepted the Council's invitation to become Patron of the Society on the departure of Sir Henry Wylie Norman, has on all possible occasions been present at the meetings, and has assisted the Society by giving it his support at all times.

The Hon. Treasurer's Financial Statement will show that the Society's funds are, although not of great magnitude, in a fairly flourishing condition.

THE HONORARY TREASURER IN ACCOUNT WITH THE ROYAL GEOGRAPHICAL SOCIETY OF AUSTRALASIA, QUEENSLAND.

Dr.

	£ s. d.	£ s. d.
1896.		
July 1.—To Balance:—		
Queensland National Bank	13 12 9	
Govt. Savings Bank	54 12 8	
		68 5 5
1897.		
July 1. ,, Subscriptions, Entrance and Fellowship Fees	105 3 6	
,, Interest on Govt. Savings Bank Deposit ..	1 12 5	
		106 15 11
		£175 1 4
1897.		
July 1.—To Balances on hand, viz.:—		
In Govt. Savings Bank	43 15 1	
,, Royal Bank ..	1 15 3	
Cash	1 4	
		£45 11 8

Cr.

	£ s. d.	£ s. d.
1896 7.		
By Advertising	1 1 0	
,, United Service Institute, Attendance, etc.	10 0 0	
,, Sundry Expenses, Meetings, Exchanges	9 2 0	
,, Library	0 14 6	
,, Postage, Stamps and Papers	2 7 6	
,, Gold Medal, Prize Essay ..	1 13 6	
,, Printing, stationery, binding, etc.	79 18 2	
,, General Account..	22 3 0	
,, Fire Insurance	2 10 0	
		129 9 8
,, Balance—		
In Govt. Savings Bank ..	43 15 1	
,, Royal Bank	1 15 3	
Cash in hand	0 1 4	
		45 11 8
		£175 1 4

Brisbane, *July 12th, 1897.*
JAMES IRVING, V.S., *Hon. Treasurer.*

Examined with Bank Books, Vouchers, etc., and found correct.
JOHN FENWICK, *Hon. Auditor.*
Brisbane, *July 23rd, 1897.*

Meetings of Council.—The Council have not confined themselves to meeting at fixed dates every month, but whenever found necessary, special meetings have been called, and the invitation to those meetings has been loyally responded to.

On the 29th July, 1896, the new Council held their first meeting, and since then there have been thirteen ordinary and four special meetings of Council.

Ordinary Meetings of Members.—Seven meetings were held in the course of the Session, at which the following papers were read :—" Notes on Mining Life and on the General Features of Pehang, Malay Peninsula "—by W. Bertrand Roberts. " A Trip to the Highlands of Southern Queensland " —by R. M. Collins, M.L.A. " Notes on the Occurrence of Copper Ore at Stanage Bay "—by H. Burkitt. " Report on the recent Investigation of the Great Barrier Reef "—by Professor Agassiz (read by Captain W. C. Thomson, who was in command of the steamer chartered by the party). " The Goldfields of New Guinea "—by W. Simpson. " The Giant Trees of Tasmania "—by J. R. Atkinson, L.S. " The Initiation Ceremonies of the Murrumbidgee Tribes "—by R. H. Mathews, L.S. " Impromptu Address on the Early Charts and Exploration of Australasia "—by J. P. Thomson. At a special general meeting the President, Mr. J. P. Thomson, gave an account of Sir William MacGregor's journey across New Guinea.

Publications.—The eleventh volume of the " Proceedings and Transactions of the Society," which was published early in the Session and placed in the hands of members, forms, in conjunction with the tenth volume issued in 1896, an excellent edition of the always carefully edited publications of the Society. From the list given above, it will be seen that only papers by well known writers, or others of exceptional merit are published.

Library.—The extent to which the Library is yearly being increased by donations and exchanges, renders it imperative that some action should be taken in order to provide additional shelf-space. For the maps and charts alone a special room is required. Several interesting and valuable volumes have been presented to the Society during the year, amongst others a complete set of the publications of the Natural History Society of Java, from the year 1852 to the year 1897, and one copy of the Report of the Horn Scientific Exploring Expedition, accompanied by a map of the route, followed after leaving Adelaide.

The Council take this opportunity of thanking those who have so kindly augmented the literary treasures of the Society. The books have been classified and re-arranged by the President and by the help of the Catalogue compiled by the Hon. Secretary, any required volume may at once be found.

Exploration.—Since the last annual meeting, the famous explorer, Dr. Nansen, has safely returned to Christiania, and is now reaping the well-earned reward of his hazardous, but nearly successful, enterprise in attempting to reach the North Pole by drifting.

M. Andrée started on Sunday, July 11th, from Spitzbergen in his balloon. When last seen, the balloon was making a N.N.E. course, travelling at the rate of 22 miles an hour. The distance from his point of departure to the

North Pole is 617 miles. With fair winds, 30 hours should enable him to reach his destination.

The Calvert Expedition, which left Adelaide last year to explore the, as yet, untrodden wilds of portions of Southern and Western Australia, has, we learn with feelings of profound regret, been accompanied by disaster, involving the death, from thirst, of two of the members of the expedition. There is little to record on the subject of Antarctic Exploration, as no further steps have been taken in the matter.

The Belgian Antarctic Expedition has started during this month, with the intention of establishing stations at various points on the Antarctic Continent. It is much to be regretted that the efforts of our sister branch in Victoria has not been fruitful of results in this direction.

London Representatives.—The Right Honourable Sir Hugh Nelson, K.C.M.G., P.C., &c., &c., Premier of Queensland; the Honourable T. J. Byrnes, B.A., Attorney-General of the Colony; and Lieutenant-Colonel H. C. Stanley, C.E., Chief Engineer of Railways, members of the Society, were invited to represent its interests at any Geographical or other Scientific function which they might attend whilst in Europe; and these gentlemen promised to do so.

Reciprocity.—The Society continues intimately in touch with kindred home and foreign societies, and maintains a regular interchange of the publications of all.

It should be mentioned that your Council, through their President, Mr. J. P. Thomson, joined with the Royal and Medical Societies in a petition to the Government to admit scientific instruments free of duty to the Colony, and it is gratifying to be able to announce, as the result of that petition, that duty is no longer payable on such instruments.

Intercolonial Geographical Congress.—No further steps have been taken in the matter of a Conference between this and the other branches of the Society in Sydney, Melbourne, and Adelaide. This is much to be regretted as, in the opinion of your Council, much benefit would accrue from an interchange of ideas, and greater vitality would be infused into the Society as a body.

For the Council, A. J. BOYD,
Hon. Sec.

On the motion of the Hon. Secretary, seconded by Hon. Wm. Allan, the Financial Statement and Report of Council were adopted.

The President delivered his anniversary address. (See p. 30).

Lord Lamington: Ladies and gentlemen,—I have to propose that we give a hearty vote of thanks to our President for the address he has given us this evening. He commenced his address by referring to the fact that it was the third time he had read a paper on the occasion of the annual meeting of this Society. I will refer to that again. I think he has touched on one topic this evening which is, of all topics dealing with any place immediately outside of Queensland, especially of interest to us, and that is New Guinea. When he referred to the fact that there had been gold rushes there lately, and that that was a matter which had particularly excited public attention, I might offer some criticism on his remarks, which pointed to the fact that there was yet gold to

be found there—gold in large and payable quantities. At all events, I think we might rest awhile before our miners direct their attention to New Guinea under all its present disadvantages, and we might pay more attention to the undoubted goldfields lying here in Queensland. That remark is, however, only a minor criticism on a very interesting paper. I might fully endorse, and am proud to do so, the encomiums that the President has passed on the jurisdiction and rule of Sir William MacGregor. Probably Her Majesty has no officer who has undertaken such an arduous task for so long a period with such excellent results. It is a matter of common knowledge how Sir William MacGregor is continually risking his life in the service of his country ; but he has not merely shown great bravery and endurance—not only has he administered that great province to the benefit of the large native population—but what one might term his very few spare moments have been almost entirely utilised in the furtherance of scientific research. In his address the President had used words to the effect that they should be careful to avoid any reproach in dealing with the native population of New Guinea. It will behove all in Australasia and New Guinea, when a new administration is appointed to New Guinea, to take every care to follow up the course of administration which Sir William MacGregor has so successfully adopted in the past. There is one point in the address, which I noticed particularly, and which referred to the fact that the native population of Fiji had been placed on a sound footing, and that there will be no danger of their extinction. I am glad to hear that assurance, as I was always under the impression that the native population might become extinct at some future date. I can only hope that Sir William MacGregor, whose first experiences were gained in Fiji, by his policy of administration in New Guinea will be able to guard against any such danger with the people in that country. I think I need not detain you longer with remarks on the paper. Mr. Thomson had hinted at the commencement of his paper that it would be his last anniversary address ; but I can only say that I hope it is far from being the last time the Society will listen to his careful researches into all that is interesting in the geographical world, which he brings before us in such clear and succinct form to the benefit and advancement of geographical knowledge, interesting us, not only in our own country, but in others connected with the Empire, and lying outside of it. I beg to propose a hearty vote of thanks to the President for his address, and I move also that the same may be printed.

The Hon. A. C. Gregory, M.L.C., seconded the motion, which was carried by acclamation.

The President: Your Excellency, ladies and gentlemen,—I thank you very cordially for the very kind expressions of appreciation you have used towards the address I have delivered and the little service I have been able to render to the Society. The next step in the programme is one, I am sure, that will give members a great deal of pleasure. I have no doubt that those who attended our last annual meeting, or have followed the work of the Society, will remember that we instituted a Fellowship of the Society. Those fellowships consist of two or three distinct grades, and the qualifications necessary to claim them are various; but amongst them comes one which is within the

category of those who have rendered distinguished services in the field of exploration and discovery. In other kindred societies they have medals and grants which are awarded to those who distinguish themselves in the field of exploration or otherwise advance geographical science. We have not instituted medals, though we would be very glad to do so it any of our members would be inclined to endow the Society with sufficient funds. We have, however, the diploma of honorary fellowship, and we wish those upon whom it may be bestowed to understand that it is equal to a medal, and is only given for distinguished services in the field of exploration or to those who have advanced the interests of the Society. I impressed on my colleagues the necessity of adhering to the qualifications in bringing forward recommendations in favour of those who claim the distinction, and the Council has agreed in that view, and that is the course we have followed in the past year. We have gone carefully over the names of those who might claim the distinction, and have decided on one award, which will be made to-night. The number of these fellowships is limited to ten, so that we have not a very large field to go upon. Some years ago, when we had the pleasure and honour of receiving Mr. H. M. Stanley, after his return from the search for Emin Pasha—Mr. Gregory was then President and took an active part in receiving him—he made a speech and said he had in England, Europe and America received medals and awards and honours of all sorts from kindred societies, *but he must confess that it was a novelty for him to receive an address from a Geographical Society in this side of the world.* They had had in London this year, and all over Europe, a very great hero in the field of exploration, who had been lionised in all the principal cities. I refer to Dr. Nansen, whose brilliant services in Arctic Exploration we all appreciate. We have felt somewhat jealous at all that lionising at home and sorry that there was no one to lionise here such as Nansen, Stanley, Jackson and so forth; but I venture to say that in Brisbane, and here in this very room, we have just as great a hero; we have here, ladies and gentlemen, the hero of the Mekong. It is on him the Society has decided to confer the fellowship honour. The Council in deciding to confer this honour upon His Excellency Lord Lamington were guided, not by His Excellency's official position at all, but entirely by his distinguished services in the field of exploration and discovery. There is, I may say, a universal brotherhood amongst all scientific men, a confraternity which is very wide and lasting in its incidence. We are glad as a scientific society to welcome scientific men from all parts of the earth; we welcome them, irrespective of creeds or anything else, and so we deal with those upon whom our honours are to be conferred. We have not departed from the well-known custom amongst scientific societies in selecting His Excellency for the distinction of fellowship. It is not as widely known as it ought to, be that His Excellency rendered very great service in the field of exploration, for he says very little about it, and therefore the Society has to step in and do what he is too modest to do himself. Some time ago Lord Lamington performed a journey through Siam, and explored the Mekong River, and carried this out so thoroughly that he won the appreciation of the British Geographical Society and all the British and Continental geographers. I will quote a passage from the remarks of the President of the Home Society when Lord Lamington presented his paper to the Society there.

"Starting from Bangkok, the capital of Siam, Lord Lamington proceeded into the interior, where he joined the party of Mr. Archer, who was employed by our Government in making a delimitation of the boundary between the Shan States and the Siamese Territory. Lord Lamington and Mr. Archer travelled for some considerable distance together, then Lord Lamington diverged to the eastward and passed through nearly 300 miles of country which had not hitherto been at all visited—much less described—by Europeans. He kept throughout his journey a very minute record of all he saw, made a most careful survey, which accords extremely well with what the British had already done on one side, and with what the French had done on the other. At last he reached the French settlement at Tong-king, remained there for some time, and then returned to Europe." Then another speaker, Mr. Holt Hallet, who knew that country very well and to whom Lord Lamington refers in his paper, said he had looked over Lord Lamington's map and found it very carefully plotted, bearings taken very correctly, and that nothing had escaped the explorer's notice. Every one appreciated the work done, and the Home Society at once placed Lord Lamington on the Council, to show some slight appreciation of his services. As he (Lord Lamington) concluded the reading of his paper the President said, "It is not a small thing for one so young, just entering on public life, to be able to say with truth that he has made a considerable contribution to human knowledge." That, coming from the President of the British Royal Geographical Society, means a great deal, and carries a great deal of weight. We know all about those proceedings here, for we watch all matters of interest in the geographical world. I consider, if I may be permitted to make the remark, that through His Excellency throwing off the mantle of an explorer and taking to the Diplomatic Service, exploration has lost very greatly, and I cannot help feeling that with some regret. We are most fortunate here in Brisbane, and have been so for many years, in having, as Her Majesty's representatives, men who have identified themselves with and distinguished themselves in geographical science. Our previous Governor took the deepest possible interest in the Society, and the Council showed its appreciation of what he had done by creating him an honorary member; if the Fellowship had been in existence then he would, no doubt, have received that distinction. We now have the privilege and very great pleasure in conferring it on His Excellency Lord Lamington, not as Governor, but in consideration of his services to exploration and discovery. I shall not occupy your time any longer. I esteem it a very great privilege in asking your Excellency, on behalf of the Council and members of this Society, to accept this honorary fellowship.

Lord Lamington: I think to-night we have listened to some breach of the old saying as to a prophet having no honour in his own country. I think it is one more proof of how unremitting our President is in the research of the proceedings of kindred societies when he is able to unearth my very small contributions to geographical knowledge. I may say that when I heard myself compared to Nansen. Well, I will not say what I thought about such an impossible comparison. I will add that we want another Nansen in this part

of the world, and if some young Queenslander would go forth and join with others in doing similar work in the Antarctic seas, I trust he would receive great honour at the hands of this Society. Let me just say in alluding to Antarctic research, it has been recently hoped that some properly conducted and properly equipped expedition would be undertaken. Before coming out here I was a member of the Council of the Geographical Society in London, and it was then considered most desirable than an expedition should go out, but lack of funds prevented this being carried out. I hope that a scheme will be started with contributions from the Australian and English geographical societies, and with the help of the Admiralty—and that shortly—some well planned and equipped expedition will start on further discoveries in the Antarctic regions. With respect to the very small field I was engaged in, there were two features making my journey of interest. I went over a portion of territory no white man had been over before, and it happened at a time when political interest was diverted to that region. Four or five years ago, just after my journey, the French took very aggressive action in the country, and at one time it was regarded as likely that there would be war between France, Siam, and our country, but, happily, through the wisdom of our statesmen, such a state of things was averted. It was by chance that I visited that country just a year before; and could, therefore, give some information on a country newly traversed by an European. I am very proud to be enrolled amongst your honorary fellows. We have many young fellows in Queensland who have opportunities near them to make investigations in this part of the world, into countries very little known, and who would be more worthily honoured by being recipients of a fellowship or other like testimonial of your regard.

The meeting then proceeded to the election of officers, with the following result:—President, Hon. Wm. Allan, F.R.G.S., M.L.C.; Vice-President, Major A. J. Boyd, Q.A., F.R.G.S.A, (Q.); Hon. Treasurer, Staff V.S. James Irving, M.R.C.V.S.L.; Hon. Secretary, Mr. J. P. Thomson, F.R.S.G.S.; Members of Council, Hon. Wm. Allan, Major A. J. Boyd, Messrs. J. Irving, J. P. Thomson, Hon. A. C. Gregory, A. Muir, C. B. Lethem, H. C. Stanley, C.E., J. Fenwick, R. M. Collins, M.L.A., C. W. De Vis, M.A., and E. Gore Jones.

Lord Lamington: Ladies and gentlemen,—I propose a vote of thanks to the retiring President. I have already had occasion to refer to his untiring energy in the interests of this Society. He has occupied the position for three years. I understand that the rules of the Society provide that no one shall hold the position for more than two years; but on account of his good will to the Society, his tact and care and devotion, it was thought last year, for the good of the Society, he should be asked to continue in his important post. This evening the very large attendance shows the increasing interest in the Society, and that is the best compliment to him, and testifies more eloquently than anything I can say to what Mr. Thomson has done for the Society. I beg to move a vote of thanks to the retiring President, and to assure him that his untiring work in this Society is very warmly appreciated. I know of no greater, more satisfying scientific aim than geographical research and ex-

ploration. I know that in my small exploration, nothing could have been more pleasant, and it must have been the same with Mr. Thomson in his researches and work in the service of this Society I hope you will all join with me in giving a hearty vote of thanks to the retiring President for the work he has done for this Society.

Major A. J. Boyd: In seconding the vote of thanks to our President, I can add very little to what His Excellency has been pleased to say in the speeches he has made to-night. I have been associated with this Society for a number of years, and have always found Mr. Thomson enthusiastic in his work. It seems the bread of life to him; nothing escapes him in the world of geographical and astronomical research. He, like his colleague, Hon. A. C. Gregory, has some knowledge of every subject that is brought before us. He is an enthusiast, and always makes a success of what he touches. For years, indeed ever since the foundation of the Society, he has been the life and soul of its work. To Mr. Thomson we owe, in a great measure, whatever knowledge we possess of the Possession of New Guinea, as his constant correspondence with Sir William MacGregor gives him exceptional opportunities for disseminating information concerning that interesting colony. More especially has Mr. Thomson's influence been felt in the last three years during which he has presided over the Society's deliberations; and now that he has again consented to take up the Secretarial duties, members may be assured that the best interest of the Society will be conserved by him as they always have been in the past. He was the original founder and Secretary and Treasurer, and when he became President, as His Excellency has just told you, the work done by him, his knowledge of the work and correspondence with other countries, and connection with other societies, very much widened our influence. I have much pleasure in seconding the motion.

The motion was carried by acclamation.

Mr. Thomson: I appreciate your kind expressions from my very heart. My little labour on behalf of the Society has been amply rewarded by the expressions of your appreciation and goodwill to-night, which I value more than I can give expression to. Everything I have done has been for the good of the Society. That has been the sentiment which has prevailed in me in all matters connected with the Society. I make way for a better man in the chair, and have much pleasure in introducing Mr. William Allan, a member of the parent society, and a very old and esteemed member of this Society.

The Hon. Wm. Allan, M.L.C.: I thank you very cordially for having promoted me to this position, but at the same time I am very much at a loss to know why I was elected. When first asked to allow myself to be nominated, I most emphatically wrote declining, and stating that I would give all possible assistance, but was not properly qualified to undertake the position as President, but on receiving the more pressing invitation of the Society, I consented, and I am here with a very great amount of trepidation, knowing the men I have to follow are much more capable than I am. It will be a very great pleasure to me if next year I feel that I have been able to worthily follow them. I feel that many were better fitted for the position. I have very little time to study

the science of geography. My work in that direction has been in the main taking up a considerable amount of country some time or the other, and putting stock on it, and improving it, but in a country like this such pioneering work is not looked upon as much. I have travelled round a little, as much as any busy man does—in India and America, in Egypt, the Cape, Norway, Java, etc. In Java I had the pleasure of travelling with the late Rev. Father Tenison-Woods and Mr. Weld-Blundell. I was in that country on the 28th August, 1883, when the great volcanic eruption of Karacatoa occurred, and 40,000 persons were destroyed in one night. I then went to England and had the honour of being made a Fellow of the Royal Geographical Society there. I am very glad to hear the late President speak as he has of Sir Wm. MacGregor. I think we are all aware of the distinguished services Sir Wm. MacGregor has been able to perform in the administration of New Guinea, and we all trust that he will have health and strength to continue his work in that country. I will not detain you longer, and I trust that in the year to come we may have, as Sir Wm. MacGregor is working in the tropics, some one to go South—some Nansen, or even that great man himself—to give us knowledge of the South, as Sir William has of the North. I thank you for the cordial manner in which you have accepted my nomination as President.

On the motion of Mr. Thomson, seconded by Mr. Alex. Muir, a hearty vote of thanks to the retiring Hon. Secretary was put to the meeting and carried unanimously.

A vote of thanks to the retiring Council, moved by Mr. Wm. Jones, and seconded by Mr. E. Gore Jones, was also accorded.

The Hon. Auditor was reappointed and warmly thanked for past services, on the motion of Mr. A. D. Walsh, seconded by Mr. James Irving.

The President conveyed the hearty thanks of the meeting to His Excellency the Governor for attending, and the proceedings closed.

Refreshments were then served, and a very pleasant half-hour spent in social harmony.

The Royal Geographical Society of Australasia.

QUEENSLAND.

DIPLOMAS OF FELLOWSHIP.

(See Resolution on page 3 of cover.)

The following gentlemen have been awarded the Diploma of Fellowship :—

Honorary :

His Excellency Sir William MacGregor, K.C.M.G., C.B., M.D., D.Sc., Hon. F.R.S.G.S.. etc.

Hon. A. C. Gregory, C.M.G., M.L.C., F.R.G.S., etc.

Major A. J. Boyd, Q.A.

His Excellency The Right Hon. Lord Lamington, K.C.M.G., B.A., F.R.G.S., Hon. F.R.S.G.S., etc.

(*b*) On *Application* :—

James Irving, Esq., M.R.C.V.S.L.

J. A. Baxendell, Esq.

William Jones, Esq.

Charles Battersby, Esq.

LIST OF MEMBERS.

(P) Members who have contributed papers which are published in the Society's "Proceedings and Transactions." The numerals indicate the number of such contributions.

(PP) Past President.

A dagger (†) prefixed to a name indicates a member of the Council.

Life members are distinguished thus (*).

Should any error or omission be found in this list, it is requested that notice thereof be given to the Hon. Secretary.

Foundation Members.

Armour, R. L., J.P., Armour & Co., Edward Street, Brisbane

P1 Atkinson, James R., J.P., Lic. Sur., Ipswich, Queensland

Bell, W., J.P., Supreme Court, Brisbane

Daniell, E. N., Survey Department, Brisbane

Gailey, R., J.P., Courier Building, Brisbane

P6PP†Gregory, Hon. A. C., C.M.G., M.L.C., F.R.G.S., &c., Mary Street, Brisbane

Lilley, Hon Sir C., Kt., Gregory Terrace, Brisbane

Marks, Hon. C. F., M.D., M.L.C., Wickham Terrace, Brisbane

*Moor. T. B., F.R.G.S., F.R.S.Tas., Strahan, West Coast, Tamania

P1†Muir, A., J.P., Queen Street, Brisbane

P26PP†Thomson, J. P., F.R.S.G.S., &c., Hon. Secretary, "Alsatia," Dornoch Terrace, South Brisbane.

Members:

Ahern, John, L.S., Charters Towers, Queensland

Aldridge, H. E., J.P., "Baddow," Maryborough, Queensland

†Allan, Hon. W., M.L.C., F.R.G.S., President, "Braeside," Dalveen, Queensland

Allan, James, J.P., Messrs. Allan & Stark, Queen Street, Brisbane

Almond, T. M., F.R.A.S., Marine Department, Brisbane

Anning, John, J.P., Charlotte Plains, Queensland

Bartholomew, T. J.P., Woombye, North Coast Line, Queensland

Battersby C., J.P., F.R.G.S.A. (Q.), Georgetown, Queensland

Baxendell, J. A., F.R.G.S.A. (Q.), Downs Grammar School, Toowoomba

Beck, R. C., J.P., Yulabilla, *via* Condamine, Queensland

Bonar, W. M., J.P., Herberton, Queensland

P5 †Boyd, Major A. J., Q.A., F.R.G.S.A.(Q.), Vice-President, Brisbane

Brown, D. L., J.P., Armour & Co., Edward Street, Brisbane

Byrnes, Hon. T. J., B.A., LL.B., M.L.A., Treasury Buildings, Brisbane

Cameron, W., Geological Survey Office, Brisbane

*Campbell, A., J.P., Glengyle Station, Birdsville, Queensland

P1 †*Collins, R. M., M.L.A., Tamrookum, Beaudesert, Queensland

P1 Cox, W. G., C.E., Adelaide Street, Brisbane

*Crorkan, T., J.P., Northam, Western Australia

Cunningham, J. S., Mundingburra, Townsville, Queensland

Cunningham, M. W., J.P., Rannes, River Dee, *via* Rockhampton, Queensland

De Vaux, R. H., Birdsville, Queensland

P1 †De Vis, C. W., M.A., The Museum, Brisbane

P1 Embley, J. T., Lic. Sur., Thursday Island, Torres Strait

†Fenwick, John, J.P., Edward Street, Brisbane

Finlay, Miss Laura Lucie, 17 Craven Hill Gardens, Hyde Park, London

Foot, J. A., J.P., Warrinilla, Rolleston, Queensland

Forster, C. E., J.P., Goondi, Johnstone River, Queensland

Frackelton, Rev. W. S., Ph.D., etc., Presbyterian Manse, Ann Street, Brisbane

Fraser, Robert, M.L.A., Elizabeth Street, Brisbane.

Fullerton, Alex. Young, B.A., L.R.C.P., M.R.C.S., Dalby, Queensland

P1 PP Griffith, His Honour Sir S. W., G.C.M.G., M.A., etc., Chief Justice, Brisbane

Gregory, Edmund, J.P., Government Printing Office, Brisbane

Gross, G., Boys' Grammar School, Brisbane
Haldane, A. C., P.M., Herberton, Queensland
Harbord, H. H., J.P., Maytown, Queensland
*Hardcastle, F. W., J.P., Headingly, Boulia, Queensland
Harkness, J. M., Messrs. Moffin, Rickards & Co., Petrie's Bight, Brisbane
Hartley, S. W., J.P., Rockhampton, Queensland
Hemmy, H. J., L.S., Kwala, Lumpor, Salangor, Straits Settlement
Hertzberg, A. M , J.P., Hertzberg & Co., Charlotte Street, Brisbane
*Holt, W. H., F.R.C.I., Wealwandangie, near Springsure, Queensland
Hughes, E. F , Dental Rooms, George Street, Brisbane
Innes, S. N., L.S., Cresswell Downs, Camooweal, Queensland
†Irving, J., M.R.C.V.S.L., J.P., F.R.G.S.A. (Q.), Hon. Treasurer, Ann Street, Brisbane
†Jones, E. Gore, Hon. Librarian, Treasury Buildings, Brisbane
Jones, Wm., J.P., F.R.G.S.A. (Q.), Stephens Street, South Brisbane
Kemnitzer, K.. the Grammar School, Townsville, Queensland
Kenealy, P., Albion, Brisbane
Kennedy, A. S., Kingsholme, Fortitude Valley, Brisbane
Klugh, C. R., J.P., Longreach, Queensland
Lamington, His Excellency The Right Hon. Lord, K.C.M.G., etc., Government House, Brisbane
Larsen, Major V., Railway Department, Roma Street, Brisbane
Lawson, R. H., Police Department, Treasury Buildings, Brisbane
†Lethem, C. B., C.E., Clayfield, Brisbane
Lloyd-Owen, E., C.E., Ipswich, Queensland
Macintosh, H., Survey Office, Brisbane
*Mathieson, John, Railway Commissioners' Office, Melbourne, Vic.
Matthews. G. S., Imperial Insurance Co., Queen Street. Brisbane
*McConnel, J. H., J.P., Cressbrook, Qneensland
McDonald, A.B., J.P., Grosvenor Downs, Clermont, Queensland
McMorrison, D. N., J.P., Camooweal, Queensland
Moran, R. W., Police Magistrate, Tambo, Queens'and
Mulligan, J. V., J.P., Limestone, Queensland
Munro, James, J.P., Webster & Co., Mary Street, Brisbane
Musgrave, Hon. A., M.L.C., Port Moresby, British New Guinea
Mylne, Thomas, J.P., Treasury Buildings, Brisbane
Nelson, Right Hon. Sir H. M., P.C., K.C.M.G., Treasury, Brisbane
Nicholas, H. C. R., J.P., Argentine, Queensland
O'Donohue, M., C.P.S., Bowen, Queensland
O'Reilly, Charles, Dornoch Terrace, South Brisbane
Owen, Capt. E. C., Head Quarters, Brigade Office, Brisbane
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Queensland Branch

OF THE

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OF

AUSTRALASIA.

13th SESSION,

1897-98.

PUBLISHED UNDER THE AUTHORITY OF THE COUNCIL OF THE SOCIETY. EDITED

BY

J. P. THOMSON, HON. F.R.S.G.S., HON. SEC.;

Corresponding Member of the New York Academy of Sciences, etc., etc.

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TRANSACTIONS

OF THE

Royal Geographical Society of Australasia,

BRISBANE.

Early Explorations on the Logan, and the Ascent of Mount Lindesay by Captain Logan in 1828.

By R. M. Collins, Esq., M.L.A.

[Read at a Meeting of the Society August 24th, 1897.]

Allan Cunningham had discovered the Darling Downs in 1827; while in the same year Captain Logan, the energetic Commandant in charge of the Penal Establishment at Moreton Bay, had examined the country about the heads of the river recently discovered by him, which he had named the Darling, but which now very properly bears his own name.

Referring to Henry Stuart Russell's book, "The Genesis of Queensland," we find the following extract from a letter by Captain Logan, addressed to the Colonial Secretary, Alexander MacLea, dated July 25, 1827:—

"I proceeded up the Brisbane on the 7th of June—as will appear by my journal—with the view of heading the river lately discovered, reaching Mount Warning, and from thence taking the most direct route to the Tweed. However, I found it impossible, notwithstanding every exertion, to get through the thick scrubs which cover the mountain in that direction; I was, in consequence, obliged to return to the Settlement without accomplishing the object of my journey. However, I have much satisfaction in reporting that the country through which I travelled exceeded my most sanguine expectations, and is everywhere exceedingly well watered; and I have no doubt,

whenever it may suit the views of Government to open it for settlers, it will be found the most desirable district for that purpose hitherto found in the colony."

The interesting country thus described by Logan was deemed worthy of a second expedition, and accordingly we find that in the following year (1828), on the 24th of July, Allan Cunningham, Captain Logan, and Mr. Fraser (the Colonial Botanist), together with five convict servants, started for the Logan, and by the 2nd August had reached within three miles of what Cunningham calls a " stupendous range of mountains."

On the following day—August 3—the party attempted to ascend the "highest mountain," but in this Logan alone completely succeeded; Cunningham, having attained an elevation sufficient for making all the necessary observations he could desire, deemed it prudent to proceed no further, especially as he had a barometer with him which it was scarcely possible to avoid injuring had he attempted to scale some almost vertical rocks immediately above him. Whilst Cunningham was occupied in taking a set of interesting bearings to points around, their "indefatigable Commandant" and Mr. Fraser continued their journey towards the summit, notwithstanding the alarming steepness of many parts of this mountain's face. Fraser accompanied Logan up the mountain till they arrived at the base of a rock nearly perpendicular, without a bush to assist them to pass above it. Here Fraser stopped (very wisely in Cunningham's opinion). It was not, however, without great difficulty, and on more than one occasion at great risk of life itself, that he found his way back to Cunningham, "much bruised and in a state of considerable exhaustion." Five hours elapsed before Captain Logan, who had, with great labour, carried the extreme summit of this formidable mountain, returned to his companions. From the summit he had seen the sea to the S.S.E., and " a fine, open grazing country breaking into plains " to the S.W. about 20 miles off. This would be about the heads of the Condamine. After describing other features, Cunningham writes as follows :—

" A lofty mountain, bearing N. by E., five miles, received from Captain Logan the title of 'Clanmorris,' whilst to a lofty

wooded peak lying about ten miles further to the north I attached the name of my friend, Lieutenant Hughes, of the Royal Staff Corps." [This peak is now known as Knapp's Peak.]

At S.S.E., five miles, a very precipitous rocky head (in figure seemingly inaccessible from any point around us) was named Mount Hooker, in honour of the mutual friend of Mr. Fraser and myself, the very learned and scientific Regius Professor of Botany in the University of Glasgow.

From the paragraph just quoted it thus appears that whilst the mountain ascended was the highest of all, one of the other very high peaks lay to the east of south, and the other to the east of north ; the mountain ascended was thus west of both the others, and, furthermore, was somewhat west of every peak or mountain described.

Comparing these descriptions with modern maps, it is clear that the mountain now marked Mount Barney was the Mount Lindesay ascended by Captain Logan in 1828, and that Cunningham's Mount Hooker is the mountain now marked Mount Lindesay on the maps; whilst Cunningham's Mount Clanmorris is marked as Mount Walker. The latitude and longitude given by Cunningham agree very closely with this view.

Captain Logan must have been a man of great courage and energy, and Allan Cunningham was justly held in high repute, both as explorer and man of science ; it was, therefore, quite natural that his description of these fine mountains, and especially of Mount Lindesay, should have attracted particular attention both in Australia and England. He writes—page 139 —*Genesis of Queensland* : "The mean height of this mountain above the level of the sea shore is shown to be 5,703 feet, which is by far the most elevated point (measured) that has hitherto been ascended by any European in Australia," and accordingly we find that in the atlases the height of Mount Lindesay (or as it is sometimes printed "Mount Lindsay" or "Mount Lindsey") is given as 5,700 feet.

Now, Australia is not a land of high mountains as compared to many other parts of the world; but height above sea level is not the only or even the most important consideration in

connection with the mountains of a country as affecting the minds and imaginations and the character of its people. Bold mountain scenery has always and everywhere had deep and important influences on national character, and in providing material for landscape painting and poetry, and thus developing artistic talent, and if, in applying such considerations as these to the case of the mountains of the United Kingdom and their influences for good, we remember that even Ben Nevis is only 4,406 feet above sea level, whilst Snowdon is only 3,570 feet, and the highest mountain in Ireland 3,414 feet, we must admit that we have good reason to be gratified and proud that we possess long ranges varying from 2,500 to 3,000, and even 3,500 feet high, with peaks reaching to 4,000 feet and over—mountains clothed for the most part with magnificent forest and scrub timber, and ferns, &c., springing from the rich volcanic soil, watered by an abundant and regular rainfall, giving rise to the beautiful cool mountain rivulets and to the numerous running streams which so delighted the early discoverers and settlers.

To ascend Mount Lindesay has ever been regarded as somewhat of a feat, and more than once we have seen accounts of so-called "first ascents" of it since Logan's day. One of these was that supplied to *The Queenslander* by Mr. Borchgrevinck some years ago—the mountain climbed by that gentleman and his companion, Mr. Brown, being—as I contend—the Mount Hooker, of Cunningham. Upon the publication of Mr. Borchgrevinck's account Mr. Meston very properly drew attention to the forgotten fact that Mount Lindesay had been ascended sixty years before, by Captain Logan, and fully described by him and Allan Cunningham.

Now it happened that a few years before Mr. Borchgrevinck's account appeared, the mountain now known as Mount Barney, and marked by that name on the maps, had been ascended by a party of four, viz., G. A. Kingsley (son of Chas. Kingsley), John Smyth, my brother (J. G. Collins), and myself, and we had observed the open plains to the S.W., about twenty miles off, and had also observed that the mountain we were on was the highest in the neighbourhood. This led us to suspect that we were on

Logan's Mount Lindesay, and that the Mount Lindesay of to-day was the Mount Hooker of sixty-nine years ago; and this seemed the more probable from the fact that since Logan's time those who have described the view from the top of Mount Lindesay have made no mention of any plains being visible to the S.W.

Mr. Pears (once Police Magistrate in South Brisbane), and Mr. T. de M. Murray-Prior, of Maroon, must, if my contention be correct, be allowed to have been the first white men who got to the top of Mount Hooker. Several people have attempted the feat since, but with the exception of Mr. Borchgrevinck and Mr. Brown, in 1890, none of them have succeeded, the difficulty of ascent justifying Cunningham's original description of it—a description, by the way, which does not apply at all to any other mountain in the neighbourhood. Although really forming a portion of the Macpherson Range (which here separates New South Wales from Queensland, and separates the waters of the Logan from those of the Richmond), this most remarkable mountain stands up in "splendid isolation," the adjacent parts of the range being comparatively low, so that the road across the border is close beneath the mountain, which rises nearly 3,000 feet above it.

The main purpose of this paper will have been attained if the attention of our Society shall have been drawn to the strange neglect which not only allowed other names to be given to our highest and most remarkable and interesting mountains, instead of the names bestowed upon them by Cunningham and Logan, but has allowed the whole story of those early discoveries to fall into almost total oblivion.

It cannot be denied that Cunningham and Logan were entitled to name the mountains. As to the distinguished man whose name they gave to the most remarkable of tkem all, I may be permitted to read the following extract from the "Life and Letters of Charles Darwin," by his son, Francis Darwin, who writes as follows:—"Sir William Hooker, born 1785, died 1865. He took charge of the Royal Gardens at Kew in 1840, when they ceased to be the private gardens of the Royal Family; in doing so he gave up his professorship at Glasgow, and with it half his income; he founded the Herbarium and Library, and within ten

years he succeeded in making the gardens the first in the world. It is not too much to say that the creation of the establishment at Kew is due to the ability and devotion of Sir Wm. Hooker; while for the subsequent development of the gardens to their present magnificent condition the nation must thank Sir Joseph Hooker, in whom the same qualities are so conspicuous."

It was fitting that the name of the illustrious Hooker should be given by Cunningham (himself a botanist) to the most remarkable mountain discovered—the "seemingly inaccessible precipitous rocky head" described; its appearance is very striking, and is much the same whether viewed from the hills about Brisbane, or from those about Casino, 120 miles to the south, where it is equally easily seen and recognised. Its peculiar appearance can be at once realised by looking at the beautiful water color picture of it in the room, painted by Mr. Geo. Hart Taylor, who is now in England; the other two pictures are by the same artist; they represent the original Mt. Lindesay, and Mt. Clanmorris, and illustrate in a pleasing manner the remarks that have been made with reference to mountains and landscape painting. Mount Hooker is over 4,000 feet high from sea level.

A few remarks in conclusion as to how the original names were lost. It was simply from the fact that at least twelve years, and probably as much as thirteen or fourteen years, elapsed from the time of their discovery before the country began to be occupied by the first settlers, just as the Darling Downs, discovered in 1827, did not begin to be settled on till Patrick Leslie came over in 1840.

Apart from the accounts which reappeared in Mr. Stuart Russell's "Genesis of Queensland" no records seem to remain of early explorations on the Logan as distinguished from early settlement, and of this settlement no printed record whatever exists so far as I know; I will, therefore, tell now what I have been able to learn as to who were the first settlers and where they came from, and as to the kind of settlement which first took place.

Under an Imperial Act of 1842 the colony of New South Wales was, for the purposes of land revenue, divided into three land districts known as Port Philip, Sydney and Moreton Bay;

it was then or in the following year that town allotments at Brisbane were first sold in Sydney, and it was about the same time that the first settlers came on to the Logan, and it is worthy of note that though men of small means they were all men of the same social class as the squatters of the present day; they nearly all came from Liverpool Plains, bringing their small flocks of sheep with them, and for many years after settling on the runs they used to drive their own bullock teams to Brisbane with their wool and for supplies.

Hunter and Fife settled on Coochin. Mocatta owned and, for a short time, lived on Telemon; after a few years it fell into the hands of Captain Collins, who, with his family, lived there many years. William Barker was the first to occupy Tamrookum, which place continued to be the home of himself and his family till about 1878. Kerry, which afterwards became incorporated with Nindooinbah, was first taken up by Henry Manning in 1841 or 1842. Manning's house and garden were the best in the district. Whitting and Hicks were the owners and first settlers on Tambourine, which then included Tabragalba. Before long, however, Tabragalba was sold to Dugald Graham, who established the homestead at its present site, and lived there for some ten years with his family. The next owner of Tambourine was Arthur Hodgson (now Sir Arthur), who brought sheep there from the Downs, where scab was to be feared.

Nindooinbah was taken up by Clement and Paul Lawless, who brought in cattle. They travelled over from Liverpool Plains with William Humphreys, who brought sheep. He occupied Mundoolun—my father, John Collins, was his partner—and two years afterwards he came there from Sydney with his family. That was in June, 1844, and soon afterwards he acquired the whole property, paying £120 for it, a price considered high then. He still lives at Mundoolun, and is one of the few old settlers who still survive. The McDonalds came to Dugandan about 1844, and lived there for a great many years. About the same time, or soon after, T. L. Murray-Prior came to Bromelton. He lived there a long time and then bought Hawkwood, on the Burnett. I think he was the first to occupy Bromelton.

Ned Hawkins owned and named Beaudesert. He went north in 1846, and Beaudesert, after a time, passed into the possession of W. D. White, who, with his family, lived there, and owned the place till the land was resumed by the Government for closer settlement. A. W. Compigné came to Nindooinbah in 1847, having purchased the run from the Lawlesses. He brought sheep with him from Bathurst, 850 miles; his bullock dray (with a pole instead of shafts) being the first of its kind to come down over Cunningham's Gap. Mr. Compigné, who has still a clear recollection of his adventures, could supply many interesting reminiscences concerning those early times.

As to the first settlers on the Logan it is interesting to note the large share they had, within a very short time, in settling the Burnett and Wide Bay districts. Ned Hawkins went out in 1846 and found good country on the Mary and Burnett rivers, and his account of it caused a great many Logan men to follow, for a few years' experience had shown that the Logan was not really sheep country. Accordingly, we find that William Humphreys went out and took up Wetheron; the Lawlesses took up Boonbyjan (which they still hold); Henry Herbert, who had been with Humphreys on Mundoolum, took up Ban Ban; and Peter Pigott took up Wigton.

It is interesting to those of us who are the descendants of the early settlers to trace out carefully, in the light of full local knowledge, the details of the description of the country given by Cunningham and Logan, and in like manner a fuller description of the early settlement of this beautiful and fertile district would be highly interesting to many, especially to the families of those hardy pioneers who, fifty-six years ago, faced the hardships and privations that had to be endured for many years (well into times distinctly clear in my own recollection). Those pioneers and their devoted wives (alas! how very few of them now remain to give any account whatever), deserve an honoured place in the history of our country, but any attempt to do them justice in this respect would be outside the scope of this paper, which is intended rather to show with what neglect we have treated those men of a still earlier day, Cunningham, Logan and Hooker, and to suggest that if it falls to anyone to make amends

for this neglect by proposing that the original names be restored to these fine mountains—of which we ought to be more proud than we are—it is to the Royal Geographical Society of Queensland.

THE PRESIDENT (Hon. William Allan) said :—

GENTLEMEN,—

I am sure you have all listened with a very great deal of interest to Mr. Collins' paper, and it raises a question whether the Government should not be approached to have an alteration made as to the name in future to be borne by what is now known as Mount Lindesay, on the Macpherson Range. Mr. Collins has made out a strong case.

Personally, I am not acquainted with the immediate vicinity of the locality referred to by Mr. Collins, though, of course, I have often seen Mount Lindesay, but touching the nomenclature of mountains, I was struck, some years ago, on a visit to a part of the Macpherson Range, about thirty miles north-west of Mount Lindesay, to find some high peaks unnamed. At that time I took a considerable amount of interest in the proposed line of railway which, it was suggested, should run from Munbilla to Warwick (properly known as the *via recta*), and on 22nd April, 1890, I started with the Railway Commissioners, Messrs. Mathieson and Johnson, Mr. Stanley, the Chief Engineer, and Mr. Lethem, the Surveyor, who I am pleased to see here to-night. We reached Fassifern the same night, where we were the guests of the late Mr. Henry Hill. I was so struck with the magnificence of the scenery through which we passed on the fôllowing two days, the wealth of vegetation, the richness of the soil, and the beauty of the climate, that some little time afterwards, at the request of some friends, I published a short account and chart of our trip. Although this locality, to which I will hereafter refer, is only a short distance comparatively from Brisbane (70 miles or so) it is all but unknown to the great majority of the residents in this city, and my paper was received with a considerable amount of interest; as it touches on the Macpherson Range alluded to by Mr. Collins, and is under 30 miles from Mount Lindesay, it may not be inapropos for me, with your permission, to read a few extracts from that pamphlet.

"On the 23rd the party started early, accompanied by Mr. Henry Hill, going through fine land, partly timbered, but mostly flats, examining the route to the shingle hut gate, 3 miles from Fassifern, on the telegraph line, having Cunningham's Gap and Mount Edwards in view. As this proposed line skirts Mount Edwards, it is generally known in this vicinity and by the surveyors as the 'Mount Edwards route,' to distinguish it from the survey made by Mr. Lethem from Rosewood to Cunningham's Gap, and known as the 'Rosewood route.' The party went through a very fine valley, nearly all the way to

Tarome, with a stream in the centre. This valley is capable of supporting a very dense population. From Tarome our party rode for 5 miles to Llandawke through heavily-grassed hilly country, most of it covered with magnificent timber. It appeared to the writer that there was sufficient ironbark and spotted gum to keep the railways going for many years to come. Striking from this spot we made the main road and telegraph line in sight of Mount Greville, towering 2,500 feet, bluff, abrupt, sombre, and very imposing. The top of this mountain is just about on a level with Cunningham's Gap and Spicer's Gap, which are seen in the distance. Following the road something under 2 miles, we struck Murrabilla.

"This afternoon's ride would require a much abler pen than mine to convey the faintest idea of it. This locality will in the future receive, and be well worthy of, the best efforts of word and scene painters and poets. Leaving Murrabilla, we ascended rapidly till in half an hour we were as far above Murrabilla as Murrabilla is above Brisbane. We now stood at an altitude of about 1,600 feet, 23½ miles from Munbilla, and 4½ from Llandawke, where the range section commences. Conspicuous around us were prominent passes and colossal peaks: Mount Greville, Mount Moon, Spicer's Peak, Spicer's Gap, an unnamed mountain height (which, in order to distinguish, we called Mount Mathieson), Mount Mitchell, Cunningham's Gap, Mount Cordeaux, and many others. From this same stand we could see where the line is surveyed, running over a jutting shelf of rocks on the edge of Mount Mathieson, 800 feet above us, and seeming quite close and overhanging, although nearly a mile away.

"A little further on, looking to our right, we came suddenly and abruptly on one of the grandest and most impressive mountain scenes it has ever been my good fortune to witness, but impossible to describe. Suddenly, from a sharp turn in the road, a great valley lay before us, running up to the head of the Rosewood, and immediately in front and far above us rose the colossal peak of Mount Cordeaux, wrapped up to within a short distance of the summit in thick, light grey clouds, and only the southern cap showing above, weird, black, and sombre. It seemed like an island suspended in the heavens, and as if about to fall and destroy us. The great grandeur of this scene, though impossible to convey in words, left an impression upon the beholders such as they will never forget. Such was the awe inspired, that at first not a word was uttered. The silence almost became painful, and, when we regained speech, whispered in hushed voices to one another, feeling it almost sacrilegious to speak in such presence. At all times this will be a magnificent view, but the traveller will be fortunate indeed who sees it under a similar guise and as it appeared to us.

"From this point Mr. Lethem traced the route followed by his survey from Rosewood to Cunningham's Gap, and we could well understand and appreciate the enormous difficulties he had to contend with in finding the best line. Every foot of the country about here he intelligently knows, and the department is fortunate in having a professional man of such energy and

capacity. Over five years he spent in examining and surveying these ranges. Proceeding we passed through part of the resumed area of the Fassifern run; thence by Clayton's Gully, where water is plentiful, timber thick, land rich, but very rough and hilly, and on to the 28-mile peg. This is right at the foot of Mount Mitchell, which rises almost perpendicularly above in a precipice 1,904 feet, or nearly to as great an altitude as Toowoomba is above Brisbane. None of us had ever seen anything so colossal as this. The height of the mountain is 3,730 feet, the level we were at 1,826 feet. It was not so much the altitude that impressed us, as the sheer abrupt precipitous formation the rock took, which exaggerated even its great height. As one of our party said, 'the carriages will want glass roofs in them in order that passengers may view the scenery here.' This will be a great resort for Brisbane visitors, especially for invalids. As well as having the benefit of bracing mountain air, it is sheltered, and Mr. Lethem says frosts are uncommon, more in fact like the Killarney climate, and the soil and timber are similar. From this point it is 3½ miles to Spicer's Gap, the highest point of the line, 2,365 feet at the Gap tunnel, which is 148 feet below the Gap.

"Leaving the 28-mile, we pushed on to see the falls, a mile and a-half distant, which one day will be a charming picnic spot. Here Cunningham's Creek discharges itself straight down about 200 feet, by our estimate. The scenery around is very wild, the vegetation luxuriant; lilies, white, and some like Indian shot abound, ferns of the staghorn, birdnest, and many other species are plentiful, and there are also various orchids.

"I have dwelt at length on this afternoon's doings, being off any track, and as the country is not known except to a few surveyors, old timber-getters, and station hands, there has indeed been no opportunity of viewing this wonderful scenery. I would that my powers of description had been more graphic in order that I might have done some justice to it. On the morning of the 24th, after climbing painfully in the mud, and over rocks, up the old track for a mile, we found we had ascended 800 feet from our starting place. The timber on each side of the road was magnificent. Trees enormous, and dense under-growth of shrub, vines, ferns and lilies. We regretted much having no adept in timber, or a botanist. Not one among us knew the names of one tree or shrub in ten. The vegetation was tropical in luxuriance, all nearly new to us, and of every tint of green, and so thick that the rain falling on the leaves sounded as if it poured on an iron roof. Vines hung in festoons, making thick curtains from tree to tree; red, black, and yellow berries were plentiful; ferns, from the fern tree down, in abundance, lilies and wild flowers everywhere, and the soil deep, and wonderfully rich. I have seen no such wealth of natural growth, except on the Johnstone River. We reached the top, after noting the line in various places, and where rounding Mount Mathieson it strikes through the last tunnel.

"At the Gap the soil is deep, red, and friable, and continued to our left over the long much-spoken-of plateau, running for a mile from the Gap towards Spicer's Peak. This is a magnificent site, large enough for a city, and where

every house could have a view of the wonderful panorama underneath. It is over 2,500 feet above the sea, and three hours or so from Brisbane."

Such, gentlemen, were the impressions left upon me, and those who accompanied me, by our trip through this beautiful range. I will not detain you longer, but trust that what has been said by Mr. Collins and myself may lead others to visit the Macpherson Range, and for themselves judge of the scenery, soil, and climate.

I beg to move a very hearty vote of thanks to Mr. Collins for his most interesting paper.

Review of Arctic Exploration.

By Captain W. C. Thomson.

[Read at a Meeting of the Society, November 11th, 1897.]

During the last year there has been quite a revival of interest in Arctic discoveries, owing to the Swedish expedition in the *Fram*, under Nansen, fitted up with all the latest improvements, and having the benefit of the experience of former navigators; and the hopes of the world ran high, that on their return they would be able to solve all for which the others had striven, namely, to demonstrate the possibility of reaching the North Pole and, if possible, to push through and find a passage through to Behring Straits, either by the N.E. or N.W. route.

The return of the *Fram* without having done either has been somewhat disappointing, and although no one would wish to rob Dr. Nansen of his honour so dearly bought, we must ever remember the Arctic heroes who did so much in exploring in the frozen regions, before all the modern appliances for the comfort of the navigator were thought of.

In glancing back one feels imbued with the spirit of "Old Mortality," who devoted his time to visiting all the graveyards and removing the moss that grew over the names of the grand characters whose mortal remains were buried below. It would be but a just tribute to the memory of those hardy old navigators to freshen the mind with the thoughts of their labours; and as they pass in solemn procession, with their quaint old ships, just think how many in the present day would risk

going out in such craft, even in ordinary climates, while they cheerfully braved the rigour of an Arctic winter, and laid the foundation of that spirit of adventure which has ever since filled the heart of every British boy, and supported the sailor amid all the dangers of discovery, and built a wall of confidence around the British Isles which has made the navy the glory of the world.

The history of Arctic explorations takes root in the old traditions of the Norsemen, when they sailed away in open boats and reached Iceland, some time in the ninth century, when they found books written in the old Irish; it may have been when Tara was in her greatness, at the beginning of the Christian era. The foregoing is well authenticated, and Sir Joseph Banks presented books, now in the British Museum, containing information of that kind found in the possession of the aborigines of Iceland.

The colonies formed in the early part of the tenth century continued to grow until late in the sixteenth century, since when they have rapidly gone down, due more to physical than political change, for evidence is everywhere that the climate of to-day is more severe than formerly, and also that great changes have taken place in the earth due to internal disturbances of fire and earthquake, which may have contributed in making the region within the Arctic Circle unfit for human abode by deflecting a warm current of water. This can be understood by comparing the warmth of the climate in the N.W. of Scotland, warmed by the Gulf Stream and the shores of Cape Horn in the same latitude.

Masses of coal or lignite have been found in Greenland, indicative of a temperate region, which in itself would account for the changes, independently of documentary evidence.

Discouraged probably by the gradual inclemency of climate, colonising ceased, and it was not until the discovery of America that Arctic voyages were again resumed. At this time, that is about the middle of the fifteenth century, the political condition of Europe was in a state of unrest.

The great discoveries made by Spain to the westward and of Portugal to the east, awoke the other powers to claim a share of the wealth which was then flowing exclusively into Spain and Portugal.

The discovery of Magellan's Straits in 1520, and the rounding of the Cape of Good Hope by the Portuguese navigators as early as 1497, demonstrated the insularity of the land to the southward, from which it was naturally inferred there would be a like passage to the north.

This idea was caught at by the English, and as early as the reign of Edward VI, in 1553, three ships, the *Bona Esperanza*, of 120 tons, Admiral Sir Hugh Willoughby, the *Bona Confidentia*, of 90 tons, the *Edward Bonaventure*, 160 tons, sailed from Deptford on 11th May, "for the discovery of places unknown."

They steered away to the eastward, after rounding North Cape. Captain Chancellor, of the *Edward Bonaventure*, entered the White Sea, and was able to return in the beginning of 1554, while the Admiral and Captain Duforth, of the *Bona Confidentia*, were frozen in on the coast of Lapland; here they all perished. Their bodies were found in the ships by Russian fishermen, and it appeared by a will found in Sir H. Willoughby's ship that he and most of the company were alive in January, 1554.

After the death of Edward VI, the marriage of Queen Mary with Philip of Spain put a stop to any expeditions which might interfere with the interests of Spain, and it was not till the reign of Elizabeth that a continuous system of exploring was entered into, with the exception of the forming of the famous Muscovite Trading Company.

In 1576 Martin Frobisher sailed to the north-west, and in a quaint old volume we find the following :—"We departed from Deptford the 8th of June in the two barks, viz., the *Gabriel* and the *Michael*, with a small pinnace of ten tons, and passing by the Court at Greenwich Her Majesty was pleased to bid farewell by shaking her hand to us out of her window. They reached as far as latitude 63deg. 8min., to a place known as Queen Elizabeth's Foreland and the straits named after Frobisher."

Here they met natives like Tartars, to whom they gave presents and took them on board, but when landing them again they seized the crew and carried them off. In retaliation they took one of the natives prisoner. They returned homeward on September 26th.

Here another curious entry is found:—"After the captain arrived in London it happened that one of the adventurers' wives threw a piece of black stone into the fire, which the captain had brought home that voyage, which, being taken forth and quenched in vinegar, glistened like gold, whereupon some refiners in London, making an assay of it, reported that it held gold, and that very richly for the quantity, and promised great matters from it if any store could be found, offering themselves to adventure for the searching of those parts, and some secretly endeavoured to get a lease from Her Majesty, thereby to engross the whole profit to themselves. The hopes of more of the same ore kindled a great opinion in the hearts of many to advance the voyage again, whereupon preparation was made for a new voyage against the year following, and the captain was directed by his commission to search for a further discovery of the passage, but especially for more of this gold ore."

Next year a second voyage was undertaken. The following account throws some strange sidelights on the state of the times:—

"We departed from Blackwall on Sunday, May 20th, in one of Her Majesty's ships called the *Aid*, of 200 tons, and 100 men, and two barks, the *Gabriel* and *Michael*, each about 30 tons, with 34 men. The next day we received the Communion aboard the *Aid* from the minister of Gravesend, and prepared ourselves as good Christians and resolute men for all fortunes, and that night fell down to the Hope.

"The next day we came to Harwich, where we stayed till Friday to take in victuals, in which time came letters from the Lords of the Council straitly commanding our General not to exceed his complement, which was 120, whereupon he discharged many proper men who, with unwilling minds, departed; he also dismissed all his condemned men which at first he thought might have been useful for some purposes, and, putting to sea the last day of May, they arrived at the entrance of Frobisher Straits on 16th July and landed on Queen's Foreland, when they saw a large number of natives. They succeeded in the capture of one to use as an interpreter after exchanging hostilities.

"The vessels now stood to the westward about 90 miles, where they found a fine harbour behind an island they named Warwick Island. We found good store of the ore which, in washing, held gold, to our thinking, plainly to be seen; whereupon the General set the miners to work. Near here they found traces of the men lost last year.

"Before leaving they made another attempt to communicate with the natives. When they landed they fiercely assaulted our men with their bows and arrows; we wounded three of them, who, finding themselves hurt, desperately leapt from the rocks into the sea and drowned themselves. The rest fled to the mountains, except one old woman and another with a child, whom we took. The old wretch, whom our sailors supposed to be a witch, had her buskin pulled off to see if she were cloven-footed, and being very ugly and deformed we let her go. The young woman and child we brought away. After taking in about 200 tons of this supposed ore we left, and arrived in Bristol about the 20th September, and the ore was placed in the castle."

A third expedition, under Captain Frobisher, with 15 ships, left Harwich on 31st May, 1578, with orders to return by end of summer laden with gold ore, with the exception of three vessels, the *Judith* (Captain Tenton), the *Anna Francis* (Captain Best), and the *Bear* (Captain Philpot), who were to remain for the winter to be able to make a good start when the ice broke up during the next season. The fleet encountered a heavy south-east gale, and sustained considerable damage; one vessel, containing a portion of the house intended to be erected to shelter those remaining the winter, was lost, which led to the abandonment of the project of the three vessels remaining behind. The fleet eventually anchored in Warwick Sound, when they all set to loading their ships, and by the end of August all took their departure for home.

Result of three voyages by Frobisher.—The result of the three voyages made by Captain Frobisher was the discovery of a sea on the west side of Greenland, but an error in his longitude places the straits named after him, and the Queen's Foreland, as lying off the south end of Greenland. This mistake was cleared up by Captain Davis, who sailed from Dartmouth in June, 1585. His account of the voyage in the opening paragraph, carries the

imprint of the times :—"Some noblemen, gentlemen, and merchants desirous to advance the glory of God and the good of their native country, consulted together about a discovery of the North-west Passage, which, having been heretofore attempted but unhappily given over by reason of some unexpected accident, they resolved, after good deliberation, to become adventurers, and accordingly did set forth two barks, viz., the *Sunshine*, of 50 tons and 23 men, John Davis, captain, and the *Moonshine*, 35 tons and 19 men, William Burton, captain. They reached as far as lat. 64deg. 15min. and landed, when they met a large number of natives. One of these, pointing to the sun, smote his breast so hard we could hear the blows ; this he did many times, till at last one of our men, pointing to the sun, struck his breast in the same manner, whereupon one of them came ashore, to whom we threw our caps, stockings, and gloves and such things as we had about us, playing with our musick and dancing 'till the night came on, when we returned aboard."

On the 6th of August they had reached as far as lat. 66deg. 40min. and clear of ice, when they anchored under a mount—the cliffs whereof were as orient as gold—we named it Mount Raleigh. They explored the large indent now known as Cumberland Sound, where they found the rise and fall of the tide to be between 36ft. and 40ft. They returned, arriving home by the end of September, fully convinced of there being a passage to the north-west. They named their furthest discovery Davis Strait.

In the following year, 1586, Captain Davis again set out with four vessels, viz., the *Mermaid*, 120 tons, *Sunshine*, 60 tons, *Moonshine*, 35 tons, and the *North Star*, pinnace, of 13 tons, to find the North-west Passage. In latitude 60degs. they separated, the *Sunshine* and *North Star* to find a way passing up between Greenland and Iceland, the *Mermaid* to prosecute further discoveries beyond Davis Strait. Captain Davis in the latter steered to the N.W., following the west coast of Greenland to lat. 66degs., and became entangled with huge masses of ice. They then steered to the west, and made the land without snow and ice in lat. 66deg. 33 mins., and long. 70degs. west of London. This position corresponds with the head of Cumberland Sound.

Great discontent led to Davis leaving the *Mermaid*, and after refitting the *Moonshine*, the former took her departure for home while the *Moonshine* went up. While lying in Cumberland Sound they found it very hot, and were troubled with mosquitoes during the month of August.

By the 11th September they had reached lat. 57deg., and with a wind at W.N.W. made for home. Nothing much was done this voyage for the extension of geographical knowledge. They found the natives hostile, and had to resort to fighting; but there was one good result of this voyage, in that it led to the establishment of the Newfoundland cod fisheries. They arrived early in October, when they found the *Sunshine*, which had only got in two days before. They reported having reached as far as the northern part of Iceland, where they lost their consort, the *North Star*, during a heavy gale.

A third voyage was made by Davis in May, 1587, in three vessels from Dartmouth; the *Elizabeth* and *Sunshine* to procure fish on the grounds found on the previous voyage, and the *Helene* to follow up the discoveries already made. Captain Davis, after arranging for the vessels to await his return, sailed along the coast of Greenland as far as latitude 72deg., where they were again beset with ice and obliged to stand to the westward, and were carried south to Mount Raleigh. Their provisions being short, they made for the other two vessels left behind, but to their great distress they found they had left, when they at once shaped a course for home, arriving at Dartmouth on 15th September.

About this time, that is towards the end of the sixteenth century, the Netherlands had succeeded in throwing off the yoke of Spain and cast longing looks at the riches of the Indies. This impulse led to the maritime development of the Dutch, and the Dutch East India Company was the result.

The powerful ships of Spain proved a great trouble to the Dutch traders in taking and plundering them either on their outward or homeward voyage with the spices and products of the East. To meet the difficulties of the case we are not surprised at these hardy North Sea men making the attempt to reach the Pacific Ocean by a northern route. At what precise date this was

done we are left in doubt, but the following account of a voyage from the Texel would suggest that a passage had been made before, either one way or the other; in all probability from the Pacific to the Atlantic.

1st Voyage.—June 5th, 1594, four ships, under the command of William Barents, sailed from the Texel on a voyage to China by the N.E. Passage. They reached as far as 77deg. 30min. N. by the 17th July. One of the ships passed to the north of Nova Zembla, reaching Cape Nassau, and returned on August 1st, and fell in with the others, one of which passed between Nova Zembla and the mainland and made to the eastward about 60 miles, when they found an open sea. They all left for the south August 15th, and arrived at the Texel 16th September.

2nd Voyage.—On the 2nd July, 1595, the United States Provinces despatched six vessels laden with merchandise to China; a seventh, a small vessel, was to accompany them for some distance (Cape Taben), then to return with news. These vessels passed through Wygate Straits, where they found a fishing station belonging to the Russians. Several attempts were made to pass, but an east wind and bad weather driving them back, Captain Barents returned, arriving September 19th.

Two vessels sailed from the United Provinces under the command of William Barents, on 13th May, and reached as far as 80degs. north, thence passing south and eastward, wintered on the N.E. end of Nova Zembla, suffering great privations, the vessels having separated before they were frozen in. One of the vessels was abandoned and the crew lived on the ice until the breaking up, when they made their way south, ultimately meeting with their companions. They reached the Hague September, 1597. They found vegetation at their extreme northern limit. On the Nova Zembla coast they found no tidal stream. William Barents died on the ice after they had started for home.

The unfortunate termination of these voyages would at first put a veto on the possibility of a passage to China by the northern route, but would certainly suggest that passages had been made from China; for it would not be at all likely that

such persistent endeavours would have been made with vessels laden with merchandise without their having something to go by.

The absolute necessity of secrecy in all the movements of the Dutch discouraged discovery so far as giving information to other nations, and the captains of the Company had to take a solemn oath on leaving Batavia that all papers or charts of former voyages were destroyed.

This at once accounts for the long silence of the Dutch navigators with reference to discoveries, until we are confronted with information in 1668 clearly showing that these cunning old Dutchmen had been laughing up their sleeve at the roundabout route other nations had been taking, while they returned home by the north.

The following extracts, taken from a paper by Joseph Moxon, a fellow of the Royal Society, England, show that it was no new thing this returning home by the north, but had evidently been carried on for years before :—

"Thus far it appears there is a free and open sea, in summer time at least, about the North Pole, but I shall add another relation of James Ben, whose father lived about five years ago in Crown Court, in Russell Street, Covent Garden, and himself now lives in Wapping.

"This Mr. Ben sailed to Japan with the Dutch as carpenter of the ship, and he told me that that year, viz., 1668, he was newly come home from Japan. I asked him how long they were under weigh home from thence. He told me he could not well tell, because when they set out from Japan the captain commanded the steersman to sail due north, and they did sail from thence about 400 Dutch miles, which is almost 27 degrees due north. I asked him whether they met with any land or islands, as I had done before the Dutch Greenland steersman. He told me, no; they saw no land, but that there was a free and open sea so far as they sailed, nor any sign of land appeared. I asked him why they sailed so far northward; he said he could not tell, only the captain commanded it, etc. But I suppose the East India Company commanded the captain either to make a discovery of land to increase trade, or to satisfy themselves with the knowledge of an open sea, that when they saw reason they might expedite their voyages between Holland and those ports that way.

"I was thus inquisitive with him, because ever since I heard the former relation of the Greenland steersman I harped at a passage through or about the North Pole to Japan, China, etc., and by these two discoveries. It appears very probable this is so, and that it is passable in the summer time."

Viewing the foregoing, after the lapse of many years, the stamp of the Dutch policy is clearly seen, and that a lucrative trade had been carried on with the east, making the return voyage that way, and that this passage between Asia and America was known long before Captain Behring gave it his name in 1741.

Between the years 1607 and 1610 Henry Hudson made three voyages to the N.W. and discovered the bay since named after him. During the last voyage a mutiny broke out on board and Captain Hudson and eight of his men were cast adrift in the boat, and, strange to say, a few years ago relics were found on the mainland showing that these hardy fellows were making their way overland to the known settlements to the south.

From 1610 to 1620 the Muscovite Company of London sent a number of vessels out yearly, but as their object was more for commerce than discovery, but little was added to goographical knowledge.

It is interesting to note here the rivalry existing between the English and Dutch, and in 1617 we find that fourteen ships, well armed, departed from Gravesend on 24th April, and meeting with a Dutch ship of 200 tons, ordered her to depart, which the Dutchman agreed to do as soon as he found his consorts. Some days after Captain Edge found the Dutchman in a snug harbour killing whales, whereon he took all they had and peremptorily ordered them off.

The English ships returned to London with 1900 tuns of oil in September of the same year. The following year we find the Zealanders had the best of it.

"And accordingly ten sail of Zealanders did get upon William Heley, Vice-Admiral of the English, uttering many uncivil speeches against his majesty, and despising his commands, alleging that there was good law in Flanders for what they did. The English defended themselves till most of their men were

killed or wounded, and being at last forced to submit the Zealanders rifled their ship, taking from them all their goods and artillery, and burning such goods as were on the *shoar*. The rest of the English ships being far dispersed could not join together and were in all places overpowered by the Flemings, to the great loss and charge of the Company, most of their ships returning home without any goods."

These disputes led to the reconstruction of the Muscovite Company, and, yearly, quite a fleet of vessels sailed from England for the procuring of *oyl*; while others continued making fresh discoveries.

William Baffin, from whom the bay takes its name, appears to have reached as far as latitude 78deg. calling the place Smith's Sound.

The next account we have of Arctic exploration is a voyage of Captain James to discover a north-west passage into the South Sea in the year 1631. Captain James rather discouraged the idea of a passage being found, in his review of the voyage, although he had heard that the Portuguese or Spaniards had reported a passage that way.

There is one important observation of his which he seems to apply the wrong way; for instance, he mentions the drift of ice to the south and eastward in huge masses, and argues therefore that if an open sea extended to the north-west the ice would all be broken up.

In the year 1676 another attempt was made to find a north-east passage by Capt. Wood, in His Majesty's ship *Speedwell*, and another called the *Prosperous*, commanded by Captain Haws. They reached as far as lat. 74deg. 46min., long. 63deg. E., where they met with disaster. They seemed to have followed the trend of the land and became entangled in the ice, and were obliged to return in the *Prosperous*, the *Speedwell* having been broken up on the rocks to the north of Nova Zembla. So many voyages having been made in the interests of discovery, only to be met with loss and disappointment, there is little wonder that for nearly the next hundred years no further attempt was made to shorten the route to India, and the several nations were contented to carry on a paying trade in whale fishing within the limits of former discoveries.

From the middle to the end of the seventeenth century the Russians were as anxious to find a north-east route as the English were to discover a way by the north-west into the Pacific Ocean. In 1648 a Russian expedition, under Deshnen, succeeded in passing through the Polar Sea into the Pacific, connecting the discoveries of Captain Behring, from whom the straits takes the name (1741). This seems strange, for we have evidence that a passage was known here as mentioned with reference to the Dutch navigators. In an old map, published in 1704, there is shown a passage corresponding with Behring Straits, which, no doubt, was copied from some of the old Dutch plans.

In 1773 the British Government equipped an expedition under Captain Phipps (afterwards Lord Mulgrave) in the *Racehorse*, and the *Carcass*, Captain Jutwidge. They reached as far north as 81degs., to the north end of Spitzbergen, but were obliged to return. It is worthy of remark that Nelson, the hero of Trafalgar, was then a boy on board the *Carcass*.

On the 28th March, 1806, the French Government sent out three frigates to cruise in the Arctic Seas, for the double purpose of harassing the British shipping and to extend their knowledge in that region. It is very interesting to note their observations and comparisons with what was then charted. Abundant evidence is collected, showing great physical changes at a comparatively recent date. Volcanic disturbances have been more active within the Arctic Circle than anywhere else on the face of the globe. Many islands and points, whose positions are well attested, are found not to exist; while places are found (which they describe) as if the whole mass had been thrown about, and presenting all the appearance of chaos.

In 1815 a Russian expedition, under Kotzebue, passed through Behring Straits, and discovered the large bay that bears his name. North from this bay he found a strong current which set him 50 miles to the north-east in 24 hours, from which he concluded that the indrift to the Polar Sea must be here. After crossing from the American to the Arctic side, he returned south. Since then the Russians have played no small part in Arctic explorations.

During the years 1816 to 1818, large quantities of ice came down from the Polar Seas, so much so that the climate was

affected to that degree that the corn would not ripen along the coast of North America.

This again opened the question of a northern route to the Pacific, and the British Government dispatched four vessels on January 15th, 1818—the *Isabella*, 385 tons, Captain John Ross, and the *Alexander*, Captain W. E. Parry, to proceed northward as far as possible by Davis Straits and reach Behring Straits; and the *Dorothea*, Captain D. Buchan, and *Trent*, Captain John Franklin, to proceed as far north as possible on the east side of Greenland, to try if possible to effect a passage that way. The *Isabella* and *Alexander* reached as far as Smith's Sound, entered Lancaster Sound, but seeing what appeared to be a range of high mountains across the bottom of the bay they returned. They coasted along the west side of Baffin Sea, discovering the trend of the land, which was named North Galway and North Ayr.

On most of the charts James' Island occupies a large place in the centre of Davis Straits, but from careful observation this island was found not to exist, a fact which demonstrates in a remarkable manner the great physical changes that have passed over this part of our globe.

Captain Ross and his consort left Davis Straits on October 1st, and arrived home 14th November of the same year.

In the meantime the *Dorothea* and *Trent* reached as far as 80deg. 37mins. and the ice so hemmed them in that they were unable to move, and felt themselves drifting to the southward with the mass; after nine days of this the ice suddenly broke up. On July 30th a sudden gale came on from the south-west, bringing back all the ice, and they became entangled. Lieutenant Beechy's graphic description of this appalling scene gives some idea of what they had to encounter, and the only means of safety was to take refuge amongst it—a practice which has been resorted to by whalers in extreme cases:—

"No language, I am convinced, can convey an adequate idea of the terrific grandeur of the effect now produced by the collision of the ice and the tempestuous ocean. The sea violently agitated and rolling in mountainous waves against an opposing body is at all times a sublime and awful sight,

but when in addition it encounters immense masses which it has set in motion with a violence equal to its own, its effect is prodigiously increased. At one moment it burst upon them in fragments, and buries them many feet beneath the wave, and the next, as the buoyancy of the depressed body struggles for reascendency, the water rushes in foaming cataracts over its edges, whilst every individual mass, rocking and labouring in its bed, grinds against and contends with its opponent until one is either split with the shock or upheaved upon the surface of the other.

"Nor is this collision confined to any particular spot. It is going on as far as the sight can reach, and when from this convulsive scene below, the eye is turned to the extraordinary appearances of the blink in the sky above; when the unnatural clearness of a calm and silvery atmosphere presents itself, bounded by a dark hard line of stormy clouds, such as at that moment lowered over our masts, as if to mark the confines within which the efforts of man would be of no avail.

"As the labouring vessel flew before the gale she soon neared the scene of danger, each person instinctively secured his own hold, and with eyes fixed upon the masts, awaited in breathless anxiety the moment of concussion. It soon arrived; the *Trent*, cutting her way through the light ice, came in violent contact with the main body. In an instant we all lost our footing and the masts bent with the impetus, and the cracking timber below bespoke a pressure which was calculated to awaken our serious apprehensions. The vessel staggered under the shock, and for a moment seemed to recoil, but the next wave curling up under her counter, drove her about her own length within the margin of the ice, where she gave one roll and was immediately thrown broadside to the wind by the succeeding wave, which beat furiously against her stern, and brought her lee-side in contact with the main body, leaving her weather side exposed at the same time to a piece of ice about twice her own dimensions.

"This unfortunate occurrence prevented the vessel penetrating sufficiently far into the ice to escape the effect of the gale, and placed her in a situation where she was assailed on all

sides by battering rams, if I may use the expression, every one of which contested the small space which she occupied, and dealt such unrelenting blows that there appeared to be scarcely any possibility of saving her from foundering.

"Literally tossed from piece to piece, we had nothing left but patiently to abide the issue, for we could scarcely keep our feet, much less render any assistance to the vessel. The motion, indeed, was so great that the ship's bell, which in the heaviest gale had never struck of itself, now tolled so continually, that it was ordered to be muffled for the purpose of escaping the unpleasant association it was calculated to produce.

"In anticipation of the worst we determined to attempt placing the launch upon the ice under our lee, and hurried into her such provisions and stores as could at the moment be got at. Serious doubts were reasonably entertained of the boat being able to live amongst the confused mass by which we were encompassed, yet as this appeared to be our only refuge we clung to it with all the eagerness of a last resource. From the injuries the vessel repeatedly received it became evident that if subjected to this concussion for any time she could not hold together long; the only chance of escape appeared to depend upon getting before the wind and penetrating further into the ice.

"To effect this with any probability of success, it became necessary to set more head sail, though at the risk of the masts, already tottering with the pressure of that which was spread, and under the additional pressure of canvas the ship came into the desired position, and with the aid of an enormous mass under her stern, she split a small field of ice fourteen feet thick, which had hitherto impeded her progress, and effected a passage for herself between the pieces, but lost sight of her consort in the clouds of spray which here tossed about, and the huge masses of ice among which they were entangled."

On the gale moderating the ships were fortunately got once more into the open sea, but so much disabled as to necessitate

their immediate return after effecting temporary repairs. They arrived in England on 15th October.

In 1819 the Lords of the Admiralty recommended that Captain Franklin be appointed to take command of an overland expedition, starting from Hudson's Bay. The object was to determine the latitude and longitude of the places west of the Coppermine River; Dr. Richardson, R.N., and Messrs. Back and Hood, midshipmen, accompanied Franklin. The privation they endured, often going without food for days, unless the following extract may be considered the bill of Polar fare:—

"On the following morning, previous to setting out, the whole party ate the remains of their old shoes and whatever scraps of leather they had, to strengthen their stomachs for the day's journey: and this was not an uncommon occurrence."

In July they reached one of the out-stations of the Hudson's Bay Company, whence they had started three years before, and thus terminated a journey of 5,550 miles, during which human courage and patience were exposed to trials such as few can bear with fortitude, unless, as seen in Franklin's interesting narrative, arising out of reliance on the ever sustaining care of an Almighty Providence.

On the 11th May, 1819, Captains Parry and Liddon, in the *Hecla*, of 375 tons, and the *Griper*, of 180 tons, left the Thames to decide the probability of a N.W. passage by Smith's and Jones' Sounds. They exploded the idea of the range of mountains in Lancaster Straits reported by Captain Ross.

On the 4th of September they crossed the meridian of 110 degrees west, and became entitled to the Government reward of £5,000. They discovered and named the islands since called the Parry Group. Here they found two herds of musk oxen and a large number of reindeer. Scurvy making an appearance, and the dread of another winter in the ice, decided them to return. They arrived home on the 30th October, 1820, having lost several of the crew during the voyage. During this season no less than eleven whaling ships were lost in the ice.

On the 8th May, 1821, Captain Parry, in the *Fury*, and Commander Lyon, in the *Hecla*, again started for the N.W.

They were frozen in for 319 days, during which the scurvy carried off several of the crew. For thirty-five days they drifted with the main pack of ice, a distance of 300 miles. They only succeeded in reaching as far as Melville Island, one of their discoveries, when they decided to return, arriving at Lerwick on 10th October, 1823.

In May, 1823, Captain Clavering sailed in the *Griper* for the north of Spitzbergen, reaching 80deg 20min. latitude, where they met with a tribe of Esquimaux; they returned 19th December of the same year.

The *Griper* was again put in commission, under Captain Lyon, and sent N.W. by way of Hudson's Straits, but becoming disabled during a heavy gale when off Wager Inlet, they were compelled to return.

Captain Parry, in the *Hecla*, and Commander Hoppner, in the *Fury*, again set out in May, 1824, to find a passage through by Lancaster Sound. They succeeded in passing through to Barrow Straits, but when off North Somerset they encountered a fearful gale of wind, and the *Fury* was forced ashore by the ice and had to be abandoned. They returned by way of Lancaster Sound, in the *Hecla*, and arrived home in October.

In 1825 Captain John Franklin made a second overland expedition, and reached as far as the mouth of the River Mackenzie, and returned after having surveyed a coast line of 374 miles. The cold experienced was intense, the thermometer at one time standing at 58degs. below zero.

In 1825 Captain Beechy, in the *Blossom*, sailed from Spithead on the 19th May, passed round Cape Horn and entered Behring Straits, and made her way to the eastward in latitude 71deg. 23min. N., longitude 156deg. 22min. W., which they named Point Barrow, and only about 155 miles west of the point reached by Franklin. They returned after waiting the time appointed, when they should have been joined by Franklin, after leaving provisions. In 1827 they again returned to Kotzebue Sound, which they surveyed. They reached as far east as Chamois Island, and left despatches for Franklin.

On 4th April, 1827, Captain Parry started on a fourth expedition in his old ship *Hecla* to pass northward by way of Spitzbergen,

when they came to an anchor at the north, and giving the place the name of the ship. They then provisioned sledge parties for 71 days, and started due north on June 22nd. On the 12th July they had reached latitude 82deg. 14min. 28sec., but found that, although they had steadily been pursuing a northerly route, they were being drifted south on the mass of ice on which they were travelling. By the 23rd they had reached latitude 32deg. 45min., and being worn out with fatiguing drudgery, and half their provisions done, they decided to return. They finally reached the ship after a journey of 21 days. As the winter was now approaching they steered for home, convinced of the possibility of a passage that way, but to ensure success an earlier start would be necessary.

Captain John Ross, meeting with chilling indifference from the Government when he offered himself for another expedition, decided to go on his own account, and purchased a small steamer called the *Victory*, of 150 tons, devoting £3,000 of his money for that purpose. They sailed from Woolwich on 23rd May, 1829, passed through Lancaster Sound, and southward into Regent's Inlet. By the end of September they had discovered and surveyed 300 miles of coast line, and were obliged to winter on the west side of the Gulf of Boothia. On the following April (1830), they started on a sledge journey, crossed the land of Boothia, and over the frozen surface of the strait now known as the Straits of Sir James Ross, and came to the island they called King William's Land. From here they returned to the ship, arriving on 13th June.

During the month of September the ice broke up, but by the 1st October they were again frozen in for the winter. During the following summer Captain Ross succeeded in planting the British flag on the Magnetic Pole in latitude 70deg. 5min. 17sec. N., and longitude 96deg. 45min. 45sec. W. They were ultimately compelled to abandon the *Victory*, and on the 23rd April, 1832, after collecting all that was useful and necessary, the expedition set out, dragging their provisions and boats over a vast expanse of rugged ice.

On the 7th October they were compelled to fall back on the *Victory* at Fury Beach, where they wintered. On the 8th

July they left their winter quarters and made for Lancaster Sound, where they were picked up by the *Isabella* whaler, and strange to say, the very ship Captain Ross made his first Arctic voyage in. They ultimately arrived at Hull on the 28th of October.

The long absence of Captain Ross, and no tidings of him, led to an overland expedition under Captain Back in 1833. This brave party did much in exploring the northern part of the continent, and suffered great privations. They returned after an absence of two years.

In 1836 Captain Back left England, on the 14th June, to examine the Straits of Fury and Hecla. From December to the following March they were beset with ice, and only succeeded in getting clear on the 14th July, almost a complete wreck, and with great difficulty managed to reach home.

Between the years 1836 and 1846 the Hudson's Bay Company sent out two expeditions—the first under Messrs. Simpson and Dease, and the second, in 1846, under Dr. Rae. These brave men did wonderful work, and their endurance was almost superhuman. They did much in giving to the scientific world a correct delineation of the north coast, and deserve the highest praise.

In 1845 the *Erebus* and *Terror* were recommissioned, and the command given to Captain Franklin, with Captain Crozier as second. They sailed from Deptford on 26th May, and the last we hear of them was when they left Disco, on the west side of Greenland, in July of the same year.

Their object was to make for Lancaster Sound and pass to the westward, and reach Behring Straits. No expedition left with higher hopes and became so utterly lost to the world. The sad fate of Sir John remained a mystery for years, and search parties looked into every nook and corner of the Arctic Sea but the right place, and it was not until Captain McClintock in the *Fox*, 1858, came upon the last sad remains of that gallant band. They had succeeded in passing through Barrow Straits and up Wellington Sound, passed on the west side of Cornwallis Island, thence down Peel Sound.

From a document found on the west side of King William's Sound, written by Captain Crozier, giving an account of the

death of Sir John, the abandonment of their ships in the ice, and their reaching this spot, and intention of proceeding the next day to reach some settlement on the mainland, near the mouth of Great Fish River. And there the sad tale ends! What happened after their leaving this place remains a mystery, as no trace of Captain Crozier's party has ever been found. Many were the conjectures as to where they would be found, and expedition followed expedition, thus forming a school for the training up of some of the finest seamen Britain has ever seen.

In 1848 the *Enterprise* and *Investigator*, under the command of Captain James Ross, went to Barrow Straits in search, but were unsuccessful. In 1850 these ships were again commissioned—the *Enterprise* under Captain Collinson, and the *Investigator* under Captain M'Clure. They sailed for Behring Straits, where they saw the *Herald* and *Plover*, sent out in 1848, expecting to meet Franklin. Captain M'Clure followed the mainland to the eastward; after passing through Behring Straits, crossed the mouth of the Mackenzie River, passed up between Banks and Prince Albert Islands, but were frozen in and had to return south when they got free. They followed the west coast of Banks Island, and rounded the north end in latitude 73deg. 40min., where they found the remains of an ancient forest, many of the trees being petrified. Captain M'Clure makes the following entry:—"I entered a ravine some miles inland, and found the north side of it, for a depth of 40ft. from the surface, composed of one mass of wood. The whole depth of the ravine was about 200ft. The ground around the wood or trees was formed of sand and shingle; some of the wood was petrified, some very rotten." On another occasion, near the same place, he found a great accumulation of fossil trees at an elevation of over 300ft. above the level of the sea. This opens a wide field of thought, and the mind becomes bewildered at the wonderful changes that must have taken place when a mild climate reigned here, permitting of such growth, and now all is ice wherever you turn.

On the 3rd June, 1853, Captain M'Clure and his gallant crew were reluctantly compelled to abandon their ship and make to the eastward in their boats in hopes of meeting with some vessels. They passed through Banks' Straits, crossed Melville Sound, and

were eventually picked up by the *Resolute* and *Intrepid*, under the command of Captain Austin, on June 17th, thus completing the passage between Behring Straits and Lancaster Sound. In the meantime Captain Collinson, in the *Enterprise*, after passing through Behring Straits, worked to the eastward, and succeeded in reaching the west side of the straits, where the *Erebus* and *Terror* were abandoned, when they had to return and work their way to the westward, passing out at Behring Straits. At this time Captain E. Belcher, the senior officer of the expedition sent out by way of Lancaster Sound, gave orders for the abandonment of the *Assistance*, *Resolute*, *Pioneer* and *Intrepid*, and they all took up their quarters on board the *North Star*, and arrived in England, September, 1854. Strange to say, the *Resolute* was found by an American whaler in September, 1855, just sixteen months after the abandonment, having drifted 1,200 miles through Barrow Straits and Baffin's Bay, and down into Davis Straits, thus showing the direction of the Polar current. The United States fitted her up in good sea-going order and sent her as a present to Her Gracious Majesty our Queen. The Queen and Prince Albert visited the ship, and on being presented to the Queen, Captain Hartstein addressed her as follows:—"Allow me to welcome your Majesty on board the *Resolute*, and in obedience to the will of my countrymen and of the President of the United States to restore her to you, not only as an evidence of a friendly feeling to your sovereignty, but as a token of love, admiration, and respect to your Majesty personally."

The interest in the search for Sir J. Franklin was not confined to Britain, for with praiseworthy promptitude America sent out and did much in examining the Arctic regions. Private enterprise, both in America and Britain, were not wanting, showing the good feeling existing between the two countries in the search. Since Captain McClintock's voyage in the *Fox*, and the finding of the remains of Franklin's party, several expeditions have gone from America.

In 1870 the *Polaris*, Captain Hall, passed up through Smith's Sound and reached latitude 84deg., where he saw an open sea to the N.W., and found the current setting to the southward. They visited the winter quarters of a former expedition under

Hayes. In 1872 the *Polaris* got a severe nip in the ice, when most of the provisions were landed on the ice to provide for the worst. Suddenly the ice broke away, and the ship was driven before a heavy gale, leaving half their number on the ice. The ship was run ashore on the coast of Greenland, and those on the ice were drifted southwards, and eventually picked up off the coast of Labrador.

This shows the natural drift, and confirms the story of Franklin's two ships having been seen in 1851 on a berg, drifting southwards off the coast of Newfoundland, a full account of which is given in the *Nautical Magazine* of 1852.

Coming down to later times, when the *Jennette* made the endeavour to pass over the North Pole from Behring Straits, and met with disaster, and the *Vega*, from Sweden, under Baron Nordenskiold, succeeded in passing along the north side of Asia during the years 1875-79, down to the present, when Nansen made that desperate rush and succeeded in reaching but a few miles further north than any of the others, one cannot help comparing the comforts enjoyed by the latter with the privations attending voyages of that kind before all the appliances for the preserving of food were introduced. A pair of old shoes and the tail of a buffalo hide cloak made a poor mess for a lot of hungry men, to fit them for an eight days' journey.

Thus far I have endeavoured to fulfil the duties of "Old Mortality," and although I have not cut the moss from off the names of all, I trust that my humble endeavours will be followed up, and the memory of our Arctic heroes will receive the honour they so richly deserve, and a warm corner in the heart of every lover of the manly and brave. In conclusion it will be seen from the experience of all the voyagers that a current sets strongly down into the Atlantic Sea from the Polar regions—the indraught of the great current setting north and spreading east and west. The easterly set carrying drift-wood and ice from the northern shores of America through such straits as Lancaster, on to the west coast of Greenland, and southward through Davis' Straits, as has been evidenced by the drift of the abandoned ships, etc. This current is strengthened in Baffin's Straits by the water from Hall and

Smith's Sounds. On the east side of Greenland the other branch of the current from the Siberian shores is felt, bringing with it the drift from the large rivers that disembogue into that part of the Arctic Sea. One remarkable feature here is that in this current the leading characteristic is field ice, while on the west side it is bergs.

As it has now been clearly demonstrated—the impracticability of the route for the purposes of navigation—we need hardly expect for many years, nay, centuries may lapse, and great physical changes take place before the frozen sea is again visited by such numbers of adventurous spirits. There is one common good that has ensued from these explorations. It has been a school for the training of our Royal and mercantile marine, brought nations together in kindly emulation, and extended the horizon of knowledge. As the next great field, the Antarctic, will soon be invaded, it will be of great interest to watch, and with the glorious example the new explorers have, they will be stimulated to achieve deeds that will win the world's well merited praise, and add to our grand list of southern explorers.

ANNIVERSARY ADDRESS.

[Delivered at the Anniversary Meeting on 11th August, 1898.]

Java.

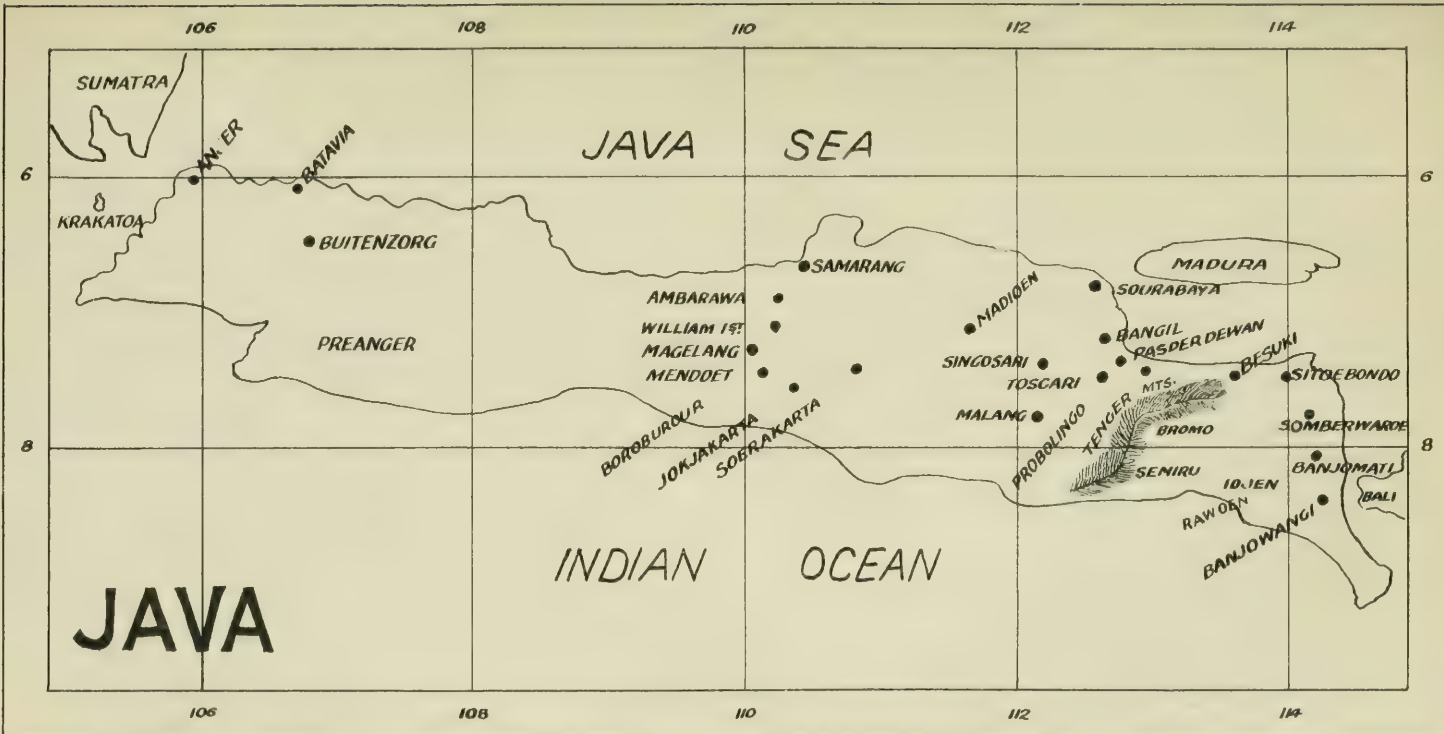
By the Hon. Wm. Allan, F.R.G.S., M.L.C,

President of the Royal Geographical Society of Australasia, Brisbane.

Strictly speaking, I presume the subject of an address at this meeting should be of a Queensland or Australian character, but as little has occurred during the past year in regard to exploration in Australia, I took the liberty of going a little further afield. Not that I am without precedents in this course, as I find in the Proceedings of our Society interesting articles on "Tucopia," by Captain J. Mackay; on "New Ireland," by Mr. D. Rannie; on "The New Hebrides," by the same gentleman; on "The Chincha Islands," by Major Boyd; and on "Viti, Fiji" and the "Melanesian Plateau," by our respected Founder and Secretary, Mr. J. P. Thomson. I therefore propose to take part of Java, which is, after all, not much further from our West Australian coast than New Guinea is from Townsville.

In August-September, 1883, I spent some time in Java with my friend, Henry Weld-Blundell (who had shortly before been a squatter and M.P. in Queensland), and with that wonderfully able and versatile scientist and good man, the late Rev. J. E. Tenison-Woods.

Java, though so close to our shores, and in fortnightly communication with us by our mail steamers, is less known, I think than any other country of the same productive power and population. This island, less than one-thirteenth the size of Queensland



NOTE— The route followed is marked thus

yet contains a population more than seven times as great as the whole of Australia. Out of the 23 millions of inhabitants, nearly $22\frac{3}{4}$ millions are natives, 48,000 are European, and the balance Chinese, with a few Arabs and Orientals. I do not propose to give an address wholly on the geography or physical geography of Java. I am not a scientist, and for any reference I may make in that direction I am indebted to notes made by my travelling companion, the late Rev. J. E. Tenison-Woods.

My purpose principally is to give some account of my journey in the lesser known parts of Java that I visited ; the people, their habits and customs, and methods of living, the scenery, the antiquities, and the volcanoes. In our parent Society I find much latitude is given in treating any subject, and I intend to take full advantage of that privilege. I do not mean to dwell, except in passing, on the better known parts of the island, such as Batavia, Samarang, and Sourabaya.

Not much is known of Java that is reliable before the Dutch occupation. It is, therefore, in the sixteenth century that we find Java becoming a subject for external notice. In 1511 the Portuguese claim to have been in communication with the inhabitants through Samien, a prince of Sunda. Prince Fatelehan, a Mohammedan prince, completed the conquest of Sunda, Java, in 1524, and the native rulers thereafter professed Mohammedanism. Previous to that date, and as far back as the fifth century, the religion of the island was known to be Buddhism and Sivaism.

The first Dutch fleet sailed, under Houtman, for Java in 1595, and were allowed to start a factory there. In 1661 the name of Batavia was given to the settlement, and the Dutch continued to increase their influence in the island, until, in 1794, the formal abdication of the sovereignty of the country was secured from the Emperor by the Dutch East India Company. The English had a settlement in Java from about 1605 till 1683, when they withdrew. In 1811, owing to Napoleon's conquests in Europe, Java became practically French, and in that year a British force reduced Java and its dependencies, and retained them until 1817. During the few years of its occupancy by the British, that born administrator, Sir Stamford Raffles, was Lieutenant-Governor, and

instituted many reforms, and his name is held in reverence among the inhabitants to this day. I much regret to say the island was restored to the Dutch in 1817.

The usual language used by the Dutch, and also by travellers and the Chinese, Arabs, &c., in communication with the natives is Malay, very aptly called the "Italian of the East." It is easily acquired, and we could make ourselves understood before we were a fortnight in the island. The natives, however, all speak two other languages—Krama, the language of ceremony, and Ngoko, the common speech. Krama is used by the common people when they address the nobles; Ngoko is spoken by the common people amongst themselves, and used by the nobles when addressing the peasants and artisans. Then again, there is the old written language of poetry and literature—Kawi, akin to Sanskrit. This, however, is only found in old manuscripts, and is the same in Java, Bali and Madura. The Javanese cannot speak it, though, strange to say, they can read it, but do not understand it. Dr. Jacobs, at Banjoewangie kindly presented me with a leaf from one of their old books from Bali, where the natives used an iron style and cut the letters on a Borassus palm-leaf, cabbage palm or pandanus, in the same manner as is in use in Western India. It is written from left to right. The leaves are about $1\frac{1}{2}$ inch wide and 14 inches long, and strung together—looking, when closed, like a venetian blind. Little has been written in this language since the overthrow of the Hindóo power by the Mohammedans. There are many manuscripts, however, in existence—no less than 500 in the Leyden University Library alone. However, the languages now in ordinary use are Krama and Ngoko, by the natives of all classes, and also Malay by the natives and those who wish to communicate with them.

The island is 600 miles long by 40 to 125 wide, and is divided into 22 districts, over each of which is placed a native prince called Regent, and a Dutchman named Resident, whom the Regent calls his "Elder Brother." The Resident actually rules, with the Regent nominally. Each district has many sub-districts, European assistant Residents and native chiefs, and each village has over it a Widona (a native chief and magistrate), who is responsible to the sub-district chief and assistant Resident. Under

the Regents and Residents are many controllers, who move from one sub-district to another and who have large powers as magistrates in settling disputes and collecting taxes, selling opium licenses, &c., &c.

The country is densely populated and increasing rapidly wherever water and cultivable land exist together. At the beginning of the century there were 3½ millions, in 1815 4½, in 1826 5⅓, in 1850 9½, in 1865 14½, in 1891 23½ millions. Everything in this country seems to work harmoniously, and it appears to me (as to nearly all who have resided in the island any time), that the Dutch seem to have discovered how Europeans can best govern native races, giving security and peace and apparent sufficiency to the governed, and great profit to those who govern them.

The Dutch maintain about 30,000 soldiers in the island, half European and half native, officered by Dutchmen. But it seems easy to rule this gentle people, and one hears of nothing much more than a native now and again running amok. One sees in cities in the interior and also in villages a watch-house here and there with two or three native watchmen, carrying long forked sticks, with which they pin anyone running amok by the back of the neck and dispatch the prisoner summarily. Running amok is mostly caused by jealousy ; a man considers himself disgraced or wronged, draws his krise, and runs at full speed, striking down all who come in his road—men, women or children—sometimes killing 10 or 15 people before being secured. The watchmen have wooden gongs upon which they strike the alarm when such occasions require it. Every native carries a krise, some two or three. The aristocracy affect valuable jewelled krises, the handle at times amounting in value to as much as £700. An ordinary krise is worth 5s. to 20s. The blade is wavy and about 15 inches long, and often poisoned with the juice of a native tree, and sometimes with lemon and arsenic, which in time eats it away.

The products of the island are mainly rice, coffee, sugar, maize, cinnamon, quinine, indigo, opium, and tobacco. The fruits are mango, mangosteen, banana, cocoanut, bread-fruit, jack-fruit, custard apples, pineapples, guavas, &c. I must not forget the durion ; it is somewhat like a bread-fruit in outward appearance.

Wallace says of them—"To eat durions is a new sensation; worth a voyage to the East to experience." There is no accounting for tastes; I never could get near enough one to try to eat it, and of all the horrible smells I ever experienced, that of the durion is the vilest.

The natural history of Java is rich and peculiar. There are enumerated 90 distinct kinds of mammalia, and 240 species of land birds, 40 of which are not known out of Java. Conspicuous among the feathered tribe are the jungle fowl (supposed to be the original stock of all domestic poultry), the peacock, several species of partridge and quail, and some fine pigeons. Wild animals are very numerous, especially on the lower slopes of the eastern end of Java. Tigers are dangerous and abundant there, as well as leopards and black panthers. The rhinoceros—two species—are found in the marshy lands. Deer are plentiful in parts, and two kinds of wild swine; wild cattle also exist. Monkeys are very numerous. There is also a large fruit-eating bat, which is much akin to the flying-fox of this country.

The animals used for draught are big, quiet, dirty, black-coloured, hairless water buffaloes, of which there are two and a-half millions in the island, also 500,000 other cattle, principally the red Bali, and a black Madurese breed, with a peculiar oval white patch behind. There are also 500,000 horses.

I will not attempt to touch on the flora with which the island abounds, or to the wealth of orchids and ferns, &c.; sufficient to say, that on one mountain alone, Mount Gedeh, Wallace remarks that 300 species of ferns are said to be found.

The temperature of the island varies, of course, according to the altitude. On the coast, say at Batavia, for instance, the thermometer gives a mean of 78·69 degs. for twelve years. The monthly mean shows a variation of only two degrees. From April to November it is slightly warmer than the remaining six months, which make up the rainy season. In the higher lands the thermometer at times falls to 32 degs.

The clothing worn by the natives is suitable and graceful. A sarong, being a piece of painted cloth, fastened at the waist, and falling nearly to the ankle; a cabiya, or short jacket of thin calico; a scarf or cumerbund tied round the waist, or at times thrown

gracefully over the shoulder. Men and women dress much alike, except that the males wear a 'kerchief tied in a peculiar manner on the head, and often a wide straw hat on top. The women wear nothing on their heads.

Rice is the main article of food.

The marriage customs are peculiar. A man marries, giving the father of the bride about 18 florins, and the priest a florin for conducting the ceremony. Should incompatibility of temper or other causes at any time occur, to make the tie irksome, the man goes to the priest, and for another florin gets a divorce, and the wife returns to her parents.

One custom among the Europeans in Java strikes a stranger at first, viz., the mid-day meal or rice-table, as it is called. A large soup plate is placed in front of you, in which you first put a quantity of rice; then is handed round various small dishes of condiments, cucumber, garlic, onions, chutnees, spices, &c., then fowl, rissoles, fish, omelettes, eggs, and so on, which you are expected to assist yourself to, and mix together with the rice on the same plate. Thereafter, there is a second course of solid meat, vegetables, &c., then dessert. Always, at the hotels, gin and bitters are put on a side table half an hour before rice-table, to which guests help themselves, and for which no charge is made. This is called "pite." With these preliminary and explanatory remarks, I will now begin our journey.

The good steamship *Chyebassa*, Captain Morris, entered the Straits of Bali on the 29th August, 1883, and sent a boat ashore at 1.30 in the morning with my two fellow travellers and myself at Banjoewangie on the western coast of Java. There is, as you are aware, a repeating station of the Eastern Telegraph Company there, and, happily for us, at 2.30 a.m., the telegraph office was open. The operator found us capital quarters.

Banjoewangie, meaning "fragrant river," is built on the alluvial flats of the Tambong River, which descends through a valley of lava on the slopes of volcanic Mount Ijen, which is 10,000 feet above the sea. It is an immense oblong crater or valley of subsidence, connected with a crater 9 or 10 miles in its greatest length, and 5 or 6 miles its greatest width, with a large opening or gorge on the south-east side down which the River Tambong flows. This

is, probably, the largest crater in the world. East and West of this valley, there are two crater lakes on the summit of the mountains—Ijen, 10,000 feet, and Rawun, 10,300 feet. Both these lakes are worth an attentive study, as they are distinct craters with a large number of lava streams dependent upon them. Ijen and Rawun and the immense distinct crater between form the nucleus of the mountain system of this end of Java.

Our luggage had been stopped and we had much trouble in getting it, and our guns and rifles were retained till orders for their release came from headquarters. In our free-and-easy British fashion we had landed without a permit, which we were unaware was required. We found we would not be allowed to move from the town without one.

The following day we paid a visit to Herr Vreissman, the Government Resident; our interview led us to thank God we lived in Australia under British rule. We were informed we could not be allowed to travel in the interior of Java without the Governor-General's sanction, and would require a formal document, which could not be procured under three weeks or a month.

For the benefit of those who wish to visit Java, I may say that any one intending to stay on the island for any period over a few days, must register his name with the police with full particulars of age, birth-place, occupation, date of arrival, and name of ship and captain. He then gets a travelling ticket "Toetlakings Kaart," giving permission to reside in any of the chief harbors or ports open for general trade, and also at Buitenzorj. To travel in the interior, however, a second and more imposing document is required, this from the Governor-General. If the traveller wishes to take his gun and rifle a third document is necessary, signed by the Resident. Happily, through our communications to Governor Weld and the British Consul in Batavia, after two days delay (which was not lost time), we got our passports. For this we found we were indebted to a great extent to the British being very popular at the moment. The great eruption of Krakatoa had just occurred, and Sir F. Weld had instantly wired to Batavia 20,000 guilder for the relief of the sufferers; this action was much appreciated. A request from Sir Frederick therefore could not well be refused at the time.

We left Banjoewangie on 1st September, 1883, at 3 a.m., in three two-wheeled carts, each of us having his own cart. These are called "Tchika Fayer," or spring waggon, and are low, long vehicles, provided with a canopy. There is no seat. The passenger (for they only carry one) reclines at full length on a mattress. There is also a large pillow. They are very easy, one can read or make notes as they go along. The Arab driver sits on the shaft. We did as much as 62 miles in one long day, with one pony each. In other parts of the island I may here state, however, we had as many as four and sometimes six ponies and changed every five miles, and besides, a fresh driver and two runners for each stage. About 20 miles out we passed Boeloeran, a very picturesque village, with quaint bamboo dovecots suspended in mid-air. Here we found the inhabitants change much in appearance. Both men and women finely formed, the latter decidedly handsome. They are mostly Madurese from the neighbouring island and much superior in physique to the Javanese. As we travelled along the natives, as soon as they noticed us coming, got off their horses and squatted on the off-side without looking towards us, and uncovered their heads; this seemed to be the habit of respect all through the interior of the island. We got so accustomed to this deference that a shade of annoyance overcame us as we approached the more populous environs of such cities as Sourabaya and Semarang where the custom did not obtain, or had fallen into disuetude. The Arab Hadjis (yellow-cloaked Mohammedan priests who had visited Mecca) were an exception to this rule, even in the interior. These Hadjis are the agitators of the island.

Beyond Boeloeran we passed through what the natives call the "Tiger Country," where travelling at night is held impossible on account of the tiger, black panther, or leopard, and so on through the town of Banjoemati where there is a Government bungalow or "pasangrahan" for the use of Government officials. We were always put up at these pasangrahans, where there was no house of accommodation or hotel, of course being charged. Between Boeloeran and Somberwaroe we were in uncultivated forest country, and accompanied for a great part of the way by numbers of large black monkeys, and their antics amused us much, springing astonishing distances from branch to

branch and with wonderful rapidity. We shot a couple to examine them; they looked pathetically human but smelt horribly.

Somberwaroe, a lovely spot, we stayed at a night, and I may describe the class of pasangrahan, or Government bungalow, here, and many were similar which we took advantage of at other stages. We were each accommodated with a large room, containing a four-post iron bedstead, mattress, beautifully clean sheets and curtains, and dined in a spacious verandah 50 x 30, with walls on either side, and the back 25 feet high. Hanging lamps gave us light. We were provided with soup, roast and boiled fowls, rice, eggs, &c., and next morning a capital breakfast, and night and morning we took advantage of their admirable baths. These baths differed, but as a rule there was a large square plastered tank, about 3 feet 6 inches deep and 8 feet 6 inches wide and long. The floor was of stone or cement and slightly slanted; a drain carried the water outside. You stand on the floor and use a large dipper and dip the water out of the tank and pour it over you. It would be an unpardonable sin to mistake these tanks for the bath and plunge into it, though one often felt inclined. The charge here as elsewhere was about 5 guilder or florins or rupees (all of which were much the same value), about 1s. 8d. each, say something under 8s. 6d. for each of us for accommodation. This town of Somberwaroe is a convict settlement for women. There were few women in it who were not convicts. Everything, as usual, in this—as in all other villages we visited—was scrupulously clean, and no garbage or rubbish to be seen about the dwellings or surroundings.

On 2nd September we left Somberwaroe, and drove through well cultivated fields, over innumerable bridges, and saw many pheasant-like wild fowl, and pigeons, also wild pigs, but lacked the time to shoot, so through Pongy, a busy and thriving place with large buildings and sugar-mill.

Everywhere were closely-planted tamarind trees, which are now old, and 60 or 70 feet high, forming fine avenues, giving ample shade, yet allowing plenty of air. Sometimes there are three rows of these trees along the perfectly kept roads. On this day's journey we saw many "proas," vessels of about 50 tons

burthen, with large outriggers on either side, which are worked in a similar manner to the Cingalese canoes, men going out on the outrigger on the windward side—one, two, or three as the case may be according to the strength of the wind, which is known and spoken of as a one, two, or three-man breeze.

We pushed on past Sitobondo, through avenues of tamarind trees, cocoanut groves, and rice fields, the picturesque natives in their variegated dresses, driving or riding bullocks of all Eastern breeds, diminutive ponies with loads on their backs, and large panniers on either side and a big aboriginal on top; the sea on the right hand, with Madura in the distance, and colossal smoking volcanic mountains on the left—all assisted to form an unique panorama.

At Sitobondo we were advised if we wished good accommodation to push on to Bisuki, if we did not fear the tigers, which were said to be plentiful. Our Chinese friends and drivers would not go, so we procured Madurese and fresh runners and reached Bisuki at 10 p.m., seeing nothing more dangerous than a few wild boars and deer. Here, as at Sitobondo, the great wealth of water and the uses it is practically put to much astonished us. We would cross a dozen substantial bridges within a mile. Every inch of arable land is cultivated and irrigated. I may say that in every part of Java irrigation is practised almost universally, and all irrigation is by gravitation, and we saw no machinery used for this purpose. We here visited the De Mass Plantation and saw the details of sugar growing as practised in the island. In many particulars this is very different from what is in vogue in Queensland, and, in my opinion, by no means as perfect. There were no refineries in the island at this time. Only one crop cutting of cane is taken, and alternated invariably with rice. This necessitates a large staff. At Herr Anderson's plantation in this vicinity there are 2,500 working bullocks, which require half that number of drivers, besides a crowd of hands for the mills, weeding, &c. The cane is never threshed. Labour is plentiful; Javanese and Madurese receive forty to fifty cents a day of twelve hours, and work in shifts of six hours each. Women are also used for day work at thirty cents a day, that is eightpence to tenpence a day for a man, sixpence for a woman,

and they find themselves in food. This is high wages in Java. In other districts, the Preanger Residency for instance, labour is fourpence, threepence, and twopence for men, women and children respectively, but living costs them only about twopence a day, and the labourer takes two holidays each week all the year round. I cannot at any length refer to the wonderful labour and culture system which exists in Java—it is a great subject in itself. Shortly, the system that obtained when I was in the island was as follows :—

The land in each campong or village was allotted each year, and partitioned among the various heads of families according to the size of the family and their capacity to cultivate it. The rent paid was one day's labour in seven, given by the head of the family or suitable substitute, and one-fifth of the crop. This one day in seven and one-fifth of crop as rent for the land was paid to the Government; or, where the land had been alienated to private persons, or belonged to native princes, it was in the same manner rendered to them. If, therefore, a good year came, so much the better for landlord and tenant; if a bad year, so much the worse for both. There is no fixed rent, but, according to the season, landlord and tenant enjoy or suffer accordingly and together. The labour provision of one day in seven, given by all agriculturists, is an old native custom and the people do not appear to consider it at all in the light of a hardship. This gives an immense permanent staff to the Government free of all cost, and thus are kept in such splendid order the roads and irrigation works, and men necessary to carry out the admirable system of local police protection and guards for the watch-houses. Each head of a family does not necessarily take his turn at this work, but the villagers appoint from among themselves the number required and pay them. These appointed are, therefore, constantly at public work and become very efficient thereat. Of course, artisans and tradesmen having no land allotted to them are exempt from the above-mentioned conditions.

Every one at Bisuki, as elsewhere, seemed comfortably off; cleanly, well fed, and well clothed; beggary or destitution appear unknown, and the same obtains all through the interior of the the island. Sugar is grown here at an altitude of 2,000 feet

above the sea. We saw here in a bamboo cage a magnificent leopard which had been trapped in the jungle near the De Mass homestead. A Royal tiger they had, had just escaped from its flimsy-looking prison.

From Bisuki we travelled on through a succession of gardens and fields in perfect cultivation to Probolingo, a town with handsome houses, squares, shops, &c., and thence to Passoweran, which is the terminus of the railway in this direction from Sourabaya. We had then come 180 miles by road from Banjoewangie.

The southern portion of the district of Passoweran is formed by the barren rugged surface of mountainous lava streams and ash deposits which abut on the south coast. This part of the district is uninhabited. On the north side of the range, which has its origin in Semeru, the River Leste takes its course, and so on into the waters which form the great delta of Sourabaya.

On the afternoon of the 5th we took train, turning off at Bangil from the main line, and continuing to Malang. The railways seem well conducted. The gauge is about the same as Queensland. The altitude from Passoweran to Malang is from 1200 to 1600 feet, and all the way the hills are terraced, and every yard cultivated and irrigated. Rice, coffee, sugar, mango, bananas, betel, alternate with plantations of djati—teak—which is a Government monopoly.

Coffee at that time seemed a wonderfully paying product, but also appeared to be almost a Government monopoly. The natives were getting 15 florins per picul of 133⅓lbs. for it from the Government, to whom they must sell it. The Government, of course, re-sell it at current rates, which was then, I understood, 40 to 50 rupees in Holland. The Government held nearly three-fourths of all the coffee grown in the island on something like these terms. Opium and salt were also altogether Government monopolies. On opium the Government made about a million a year through licenses and imports. Although opium is much used in the island we never noticed its abuse, and in this connection I may also state that we did not observe a single case of drunkenness while in Java.

Malang lies on the tableland between Mount Kawi and Mount Tengger. The former is 9,580 feet above sea level, and is an active crater; Mount Arjuno, also a crater, is to the NNE., about 10,000 feet high. Mount Arjuno is called after one of the sons of Pandu, who is the hero of Javanese poetry.

Malang is an extensive military station and sanatorium, soldiers are everywhere—European and native. They dress in precisely the same manner, in blue tunics and bag trousers and kepi, only the native troops are minus boots and shoes. There are also fair military bands, although the Dutch do not seem a musical people. We had not so far seen or heard a piano or harmonium in the island.

The Chinese are much in evidence here, and build fine private mansions with tasteful surroundings. Many of them have acquired great wealth, and one in Sourabaya is taxed on 30,000,000 rupees, and others in Semarang still more highly. The Dutch civil and military officials whom we met mostly spoke English fairly.

We drove out from Malang (7 miles) to Singosari (meaning "lion flower") to visit the wonderful ruins of the Hindoo temples there. First we came to two colossal figures cut out of solid dolerite, both well preserved and about 12 feet high and 9 feet across the shoulders. They have originally evidently guarded the entrance to a temple which has now disappeared. They are both in a semi-kneeling position; one has the right hand uplifted, with the second and third fingers extended, the other fingers closed, like a bishop giving a blessing, and in the other hand a sceptre, resting on the ground. The other figure has the sceptre or staff in the right hand, in a similar position to the first, but his left hand is resting on the knee. The mouths are open, showing teeth like a monkey, and large tusks. For earrings they have human skulls, and a serpent is coiled around the shoulder. A belt of skulls encircles the corpulent stomach. Several life figures of Brahmin bulls (Nandi) with hump on top of shoulder are also scattered about—some of these are gorgeously caparisoned. There is also a figure of an elephant, about six feet high, in a sitting posture, and many other statues and carvings, all evidently of Brahmin origin. About a quarter of a mile further we came to

a temple in fair preservation, surrounded by frangipanni trees, which seem to abound in Java in the vicinity of shrines and cemeteries. This temple is about 40 feet or 50 feet high—square, and terraced from base to top—and around it are some twenty statues, similar to those just described, but smaller, the only variation being two very good figures of Durga (the chief wife of Siva) and child. We entered up a flight of steps and found other figures there, and an altar, and, strange it seemed, though the people here are professedly Mohammedan, who are supposed to abhor figures of any sort in worship, yet prostrate themselves and make offerings of flowers at these shrines. These are more commonly the gifts of women. Mr. Tenison-Woods, while we were in the temple, took up some of the flowers from off an idol to examine them, when one of the women burst into tears, and we were told she held his action as an unpropitious sign.

I may remark that the Mohammedanism of the Javanese is of a much less strict character than that I have observed in any other part of the world. The women do not veil, nor are any strict observances apparent either in eating or drinking. Mosques we saw few of and prayer in public none of. The Dutch discourage proselytizing, considering apparently that the prevalent belief is sufficient for the needs of the people. There are here, and also about Malang, many stone slabs inscribed closely all over, and on sides and edges, with ancient Sanskrit, but I was told that an Oriental scholar, who had been able to decipher the writing, stated they only contained verses from the Hindoo sacred writings, and threw no light on the history of the temples, or date of their erection.

On September 8th we started in a trap with six ponies for Toscari, en route to the great Bromo volcano at Tenger. The quaintness and beauty of the scenery it is difficult to give an adequate idea of. Some distance after leaving Malang, we travelled along a narrow razorback or path a few feet wide, with gorges apparently fully a thousand feet deep to our right and mountains sheer a thousand feet high on our left, and a wealth of indigenous vegetation all around. Streams appeared in the most improbable places with cascades and waterfalls here and there; enormous forest trees festooned with vines of every shade

of green ; while underneath grew the great giant palms and coffee plants with pendant white blossoms, variegated plentifully with the brilliant crimson flowers of the coral tree, making altogether a rare scene of beauty. Fifteen miles on the road we had to change for saddle ponies, the track being impassable for vehicles. At Toscari, 5,000 feet above Malang, the hotel is situated on the jutting point of a mountain and embraces a view of many villages underneath and on either side, and hence over a vast flat of cultivation to the sea. For the first time in the island we saw blankets and required them. Fogs are prevalent, and nine-tenths of the day one is enveloped in clouds.

On the morning of September 8th we made an early start from Toscari for the Bromo volcano, and after an hour and a-half's charming ride in the cool clear air through the mountains, we came to the rest-house, and at once in view of that wondrous spectacle of the Bromo crater cone rising some 500 feet out of the sand sea. Bromo is surrounded on three sides by a lake of sand, which, from its similarity to the sand on the sea shore, is called the sand sea, and is about a mile and a-half wide by about five long, and itself the bed of the larger crater from which Bromo rises. From this point, we were some 500 feet immediately above the sand, and two miles from the active crater, which there rises out of the sand sea some 500 feet, emitting smoke and steam, and roaring and rumbling with ominous voice. This, we could hear for many miles before we reached it.

Before descending into the sand sea, we took our glasses to examine Semeru, the highest volcano in the island, 12,500 feet, and apparently about 14 miles distant, and then perfectly quiescent. While gazing, a sudden eruption burst from its summit, so impressively grand, that not only we travellers, but the resident Dutch gentleman and coolies who were with us, stood silent and awestruck. First arose a column of smoke, black and sombre, quickly changing to larger dimensions of a lighter shade, in shape resembling a colossal eucalyptus ; through this shot a geyser of ashes and stones to a height, we calculated, of 3,000 feet above the summit, and we could easily see with our glasses the fall of stones or pumice down the sides of the mountain. As the eruption continued, the thick smoke and

matter vomited from the crater hid the volcano from us, but I shall never forget the magnificence of the phenomena as we first beheld it. The Semeru was at that time in most active working and emitted lava plentifully, which showed at night like streams of molten iron.

To the active crater of Bromo we now wended our way down a most precipitous path, and when we reached the sand sea, were covered with dust and ash. We were now in an amphitheatre with walls 500 to 1000 feet high. Riding across the sand sea and round the base of "Bato" (a conical hill in the sand sea), we reached the foot of the crater, and rode two-thirds of the way up, ascending the remainder by roughly-made steps to the mouth. The whole of the cone is scoria, pumice and ash without any vegetation. Indeed this volcano never seems to have emitted lava, but ash alone, and the whole surrounding country bears more or less evidence of this, especially between Bromo, Toscari and Malang, the soil all being ash deposit apparently. With some fatigue we reached the top, and from the edge of the crater calculated that it was about a mile in circumference and 400 feet or so deep. The sulphurous steam kept rising continuously and the roar was at times like many steam engines, and then again sinking to a deep, dull sullen growl. We could not see the workings, nor from whence the steam and vapour exuded in such volumes although the wind was in our favour. One of our Dutch companions informed us that it was not working when he had seen it some years previously, and had much altered of late. D'Almeida visited it in the early sixties. It was then in full working, and he has left an account of it, the only one I know. The fumes rose to a great height now, and spread like a canopy over the mountains. The sides of the chasm were coated with sulphur, more especially towards the bottom; the whole surroundings were drear, wild, and desolate in the extreme, and with Semeru also in the vicinity, we could not but have in remembrance the great calamity which had occurred a fortnight previously at the eruption of Krakatoa, with its 36,000 victims, and the sound of which at that time could be heard here distinctly. This barren and weird scene contrasted sharply and not pleasantly with the garden-like, fruitful, peaceful, beautiful country we had

been passing through that morning. Bromo is visited annually by the mountaineers in this vicinity who profess the old religion, and by the Mohammedans are called "heathen," and a festival is held in honour of the god Brahma after whom the mountain is named. Flowers, fruit, fowls, etc., are offered and then thrown into the crater. Strange that many Javanese Mohammedans join in this ceremony.

Next day we had to rest at Toscari, as I had contracted the fever of the country, all the blankets procurable could not give me warmth even at mid-day. This fever I completely threw off when I got on board ship, but I regret to say my dear friend, Father Tenison-Woods, was attacked by it on his second visit, and eventually it cost him his life.

On September 11th, en route back to Malang, we visited Tampat-Mundi (bathing place), situated about five miles from Malang, a large sheet of water, clear and limpid, kept pure by a running stream, besides springs. Men, women and children, promiscuously with ducks, buffaloes and ponies, disport therein. On the bank is a large reserved tank, under the charge of keepers and supplied by a spring. This tank can be lowered or raised at will, is full of fish, and is also a perfectly secluded and luxurious bathing place. Monkeys of various breeds (here held sacred) disport around, perfectly docile, at a distance of six yards, but unsafe when nearer.

On September 12th we proceeded by train to Sourabaya, past railway stations apparently whitewashed and cleaned only yesterday, so neat and scrupulously shipshape does everything appear about them, and indeed about every place we have had to stay, including hotels and native villages. We were informed the country had been suffering from a prolonged drought of five months, yet showed to us no sign thereof, but was a succession of luxuriant fields of rice, sugar, indigo, &c., with the usual intermediate groves of palm, fruit trees, flowering shrubs, and interminable crowds of people, well fed and happy looking, and this reminds me that we have not once heard any angry word spoken, nor observed a black look, thrown either to us or between themselves.

With Sourabaya, a city of 100,000 inhabitants, we were not impressed. The streets are narrow and, from a Javanese standpoint, not clean. The river, which was crowded with craft, was also a sewerage entrepot for all refuse ; altogether the surroundings were not such as to impress a stranger favourably who had seen the interior and the much superior habits of the inhabitants there. The coast Malay and Chinese elements are largely represented, as they are in Semarang and Batavia, and those who only visit these centres get a very wrong and unfavourable impression of the country and its people.

In the interior at the hotels, and in this centre we were rather surprised to find European ladies, until dinner time, dress in similar fashion to the native women, only apparently with finer quality, but even less quantity. This dress consists of a loose short cabiya jacket open well down in front, a sarong, which I have already described, a piece of ribbon tying the hair which falls loose down the back, a pair of Chinese slippers with the toes only stuck in. This light costume, minus stockings, or anything else apparently, completes a lady's toilet for breakfast, lunch, driving, or walking until dinner at 8 p.m. The young Dutch ladies of 12 or 14 going to school are singularly clad, hair done as before described, a short, white, loose jacket falling below the waist, and a pair of light continuations called monkey trousers. The heat did not seem to us more oppressive than it often is in Northern Queensland, and we had difficulty in understanding the necessity for this assumption of native dress.

From Sourabaya we travelled by train to Madioen, through large irrigated cultivated plains, with groves of betel palm, cocoanuts, and tamarinds. Madioen seen from any point seems to be situated in the centre of a circle of mountains. The Pandan mountains are seen to the north, the Patjitan to the south, the volcanic Lawu to the west. On Mount Lawu, at a height of 3,000 feet, and again on another spur at over 4,000 feet, are the ruins of the temples of Suku and Chato respectively. These are Hindoo in character, and a date 1439 exists on one.

A singular fact connected with the physical geography and river system of this part of Java is, that the three largest rivers of the island all have their sources within a few miles of the

south coast. That is to say, although these rivers traverse the island and flow into the Java Sea, they take their rise within a few miles of the Indian Ocean.

From Madioen we journeyed to Soarokarta, where the native Emperor resides; Susuhuman he is called by the natives. Here, and in the neighbouring city of Djokokarta, where the Sultan (another potentate) has his seat, and in the districts of the same name, Soarokarta and Djokokarta, the native rulers are still denominated Emperor and Sultan, and are supposed to be independent. This, however, is a myth, as a Dutch Resident is here, as in all other residences, and although a certain latitude is allowed, and state kept up, and these native rulers permitted to have a company of native soldiers, yet there is a Dutch fort in both places, and Dutch troops, who are *supposed* to be there for the protection of the Emperor and Sultan respectively, against insurrection. The cities are large, and Djokokarta has, I understood, a population of 300,000. The lands are wonderfully rich, and cultivation admirable, but the roads are far from as good as in those districts where the Dutch are more conspicuously the rulers.

We visited the remains of the old citadel of Solo, which are extensive but much mutilated, and also the grand old ruins of the Buddhist temples of Brabanam, but time will not permit of a description of these. We also had the honour of being invited to a reception and ball given by the Emperor of Soarokarta, and had an opportunity of seeing more of the aristocratic native element than we had hitherto. The native ladies' dress was of the same character as the everyday attire of the women in the country, but much finer quality, silks and brocades mostly. They were adorned with enormous quantities of jewellery, ear-rings as large as brooches, bracelets, rings, and jewelled hairpins in profusion. The young women had magnificent eyes and eye-lashes, and hair drawn back, and neatly dressed with two loops behind. If it were not for the betel nut chewing, and consequent black teeth, and the large and flat noses, many would be considered pretty. Here we saw the nautch dance, and were struck with the gravity of the whole proceeding, Several girls, fairly good-looking, rose, and to the monotonous music moved

about without apparently any violent exertion, waving their arms slowly, and posturing solemnly, swaying their bodies into many attitudes, no smile illuminating their faces, and the audience looking on with profound solemnity. Quiet and modest in dress and deportment, these girls did not in any way remind us of the ladies of the ballet. Had the performance lasted however a little longer, I imagine we would have all been asleep. The music of the large native band, or "gamelang," was not disagreeable, but somewhat akin to, though better, than that of the Chinese. There were many performers, on many different instruments, but we could find no air or tune, though something of harmony and time.

On 19th we left Joko for Boro Burdur in two carriages, with six horses, and stopped to examine some temples on the way, in fact, we were now in a region of temples. We passed many to-day that in any other country travellers would make long pilgrimages to see, but we pushed on to reach Boro Burdur. Sir Stamford Raffles, 80 years ago, wrote as follows:—"In the interior of Java are temples that as works of labour and of art, dwarf to nothing all our wonder and admiration at the Pyramids of Egypt." Wallace, in his "Malay Archipelago," says:—"These Javanese temples are covered with sculptures of Hindoo mythology that surpass any that exist in India." Again of Boro Burdur—"The amount of human labour and skill expended on the great Pyramid of Egypt sinks into insignificance when compared with that required to complete this sculptured hill temple in the interior of Java." I have seen the Pyramids more than once, and I very fully endorse Sir Stamford Raffles' and Mr. Wallace's verdict. There is no comparison. As has truly been said, Boro Burdur is a "dream in stone." Some distance from the great temple we leave the carriages and cross the river, and proceed on foot. There is happily no other building near it; it is on a small hill, between four great volcanoes. When it was erected no one knows, yet it stands the greatest monument to Buddha that exists. The Javanese chronicles place the date of its commencement as in the seventh century. D'Almeida puts the date at about 1344. It is of trachyte, obtained from the volcanoes in the vicinity. No mortar is used, and the stones are mortised one into another, and

the legend has it that these were all perfectly cut, fitted, and carved, and everything in connection with this great work was in course of preparation for years previously, and when all was ready, the whole of the artisans in the island met, and put it together, in one day, without the sound of a hammer. Whether put together in one day, or, as others have it, in 600 years, it stands now a colossal and magnificent monument of the love that was borne to Buddha by his followers. The entrance to the temple that we took (there are two) was along a wide paved passage, guarded on either side by colossal stone lions, somewhat of the Assyrian type, thence up a flight of steps to the first terrace. Though touched by the hand of time, and neglected by those whose pride it should be to preserve it, yet is Boro Burdur no ruin, and it is due to that grand Englishman, Sir Stamford Raffles, that we are able to see it as it is to-day. He had it cleared of vegetation and growing trees, that in a country like Java soon utterly destroy even such temples as these, dove-tailed though the stones are one into the other. Such unchecked natural growth has resulted in the ruin of Brabanam, Mendoet, and Singosari, and many other temples in the island, and such would have been the fate of this also but for the forethought of the British Governor in 1815. I was informed that one of the provisoes in handing the island over to the Dutch was that two men should be continually employed in keeping down the vegetable growth on this grand pile. It is hard to give an adequate idea of this poem in stone. There in front of us was this grand pyramidal temple, 118 feet high, and 520 feet square each way at the base, and composed of 472 other temples, each a gem in itself, built terrace above terrace, the five lower terraces being square, the three higher circular, with a beautiful dome-like temple 50ft. in diameter on top. All of these temples contains a statue of Buddha, or Gautama, each having that aspect of ineffable repose which these figures always exhibit. On every side of each terrace are elaborately sculptured alto-relievos. These are mostly as clear and perfect as the day they were cut, and of the large reliefs alone there are over 2,000 vigorously designed and carefully executed. On the lower terraces are represented scenes from the life of Buddha. On the others are depicted various subjects—battles, sea fights, processions, chariot

races—carried to an extent unrivalled, I believe, by any other building in the world, all beautifully represented and the treatment of each artistic, pure, and refined, contrasting thus favourably with other Buddhist temples in Ceylon and elsewhere I have visited. The temples on the four lower terraces are open, and many of the statues have been mutilated; but this is not so of those in the niches in the three higher, which are guarded by stone lattice work, through the interspaces of which alone the figures can be seen. From one terrace to another are flights of steps and an arched doorway over each. At the corner of each terrace and at the sides of the stairs are gargoyles, as in Gothic architecture.

These are shaped as elephants' heads, having the trunk turned upwards and over the forehead.

The view from the top is grand in the extreme, one looks down on a lace-like panorama of fields and groves on either side, intersected with streams, the hills beyond terraced and irrigated, the river winding at the foot, and the volcanic mountains in the distance all tend to add to the fairy-like charm of this wonderland. This sermon in stone is utterly different from anything elsewhere. Massive and grand as a whole, exquisitively beautiful in detail and proportion, it seems to me, nowhere else in the world have any people left such a colossal monument of art behind them.

Leaving Boro Burdur we travelled to Magelang by two special coaches, six ponies in each, and two runners for each, besides driver, through densely populated rich country, thence to the town of Wilhelm I., named the "Garden of Java," an immense amphitheatre, the hills around terraced so as to seem like steps and seats around, down to the arena. Thence to Abrawatta, part of the way having bullocks pulling in front of the ponies; and took train to Semarang.

This city is next in importance to Sourabaya but it is far more attractive in appearance, the streets are wider, more cleanly and boast of better buildings. A brown coal is got in the vicinity. The district is probably the most thickly populated of any part of Java or the Indian Archipelago.

We left Semarang in a steamer, the *Cheribone*, on the 22nd September, and reached Batavia next day, and that

city and Buitenzerg which we visited I need say nothing of, they are so well known. For the following notes on the physical geography of the island I am indebted to my travelling companion, the late Rev. J. E. Tenison-Woods, and may be briefly stated thus :—A long and narrow volcanic island, extending east and west, high and precipitous for the whole extent of its southern side, and consisting entirely on its northern side of low alluvial and to some extent marshy plains. These alluvial plains extend for long distances out to sea where the waters are extremely shallow and the coast without the protection of any high land. The seas of the southern coast, on the contrary, are very deep and scarcely affording any shelter for vessels. The high lands of the south coast are entirely formed by volcanic cones connected with one another only by irregular ash and lava deposits which have flowed from them. Apparently there is no range of elevation apart from the craters, but it suggests itself that the ancient land, if there has been any such, was a range along what is now known as the southern coast. First of all, it is a watershed without a break of any kind. Secondly, whatever fossiliferous formations are found in the island occur in this range. Thus there are recognised Miocene and Pliocene rocks, and probably Eocene beds as well. There is also a Tertiary coal formation, and Palæozoic slates and schists or metamorphic strata. There are but few places where these rocks become visible, possibly indicating the narrow limits of the land ere the volcanic outbursts commenced to modify it into its present form. The subsidiary ranges in the centre of the island appear to be entirely of volcanic origin. They are of small extent, and are pierced in one case by a large river. It is, however, to be borne in mind that in general direction they correspond with the main divide, which is the axial direction of the island and of the volcanic fissure extending through so many islands to the eastward before it finally turns to the north towards the Philippine Islands.

One remarkable feature connected with the volcanic disturbance manifested in Java has been the part played by subsidence in the formation of craters. All of the mountains on the eastern side of the island have upon their summits craters of very large dimensions. I may here state that there are 45 volcanic mountains in Java.

While on this journey, naturally, the principal topic of conversation at that time was the late eruption of Krakatoa, which took place on the 27th, 28th, and 29th of the previous month. When at Buitenzorg on 25th September, we called on the Governor-General, who informed us that, up till that date, his returns showed that 36,000 persons had perished. The steamship *Governor-General Lowden*, of the Netherlands-India Co., went through a unique experience at that time, and the second engineer gave Mr. Basil Worstfold the following description, which, in conclusion, I will quote. He says :—" We were anchored off Telobetong, in Sumatra, when the chief officer and myself observed a dark line out at sea which bore the appearance of a tidal wave. While we were remarking this, the captain, who was taking his bath, rushed on to the bridge, and telegraphed to the engine-room to steam slow ahead up to the anchors. I was engaged in carrying out this order when the wave came up to the ship. First she dropped, then heaved up and down for some five minutes. There were three waves. When I came up on deck again, the long pier, which had been crowded with Europeans who had come out of the town, they had experienced a shock of earthquake during the night ; this pier, the houses and offices, had disappeared—in fact, the whole town was gone. A Government steamboat lying at anchor, with steam up, in the bay, was landed high on the tops of the palm trees in company with some native boats. That was the first intimation we received that Krakatoa was in eruption, and from that time, eight o'clock, onwards through the day, the rumbling thunder never ceased, while the darkness increased to a thick impenetrable covering of smoky vapor. Shortly after this we got underway and proceeded until the darkness made it impossible to go on further. It was while we were thus enveloped in darkness that the stones and cinders discharged by the mountain began to fall upon the ship. In a short time the canvas awning and the deck were covered with ashes and stones, to a depth of two feet, and all our available men were employed in removing the falling mass, which would otherwise have sunk the ship. We had a large number of natives on board, and a hundred and sixty European soldiers. The latter worked with the energy of despair

at their task of clearing the deck, in spite of the twofold danger of being burnt and stunned by the hot falling stones. While we were engaged in this struggle, and enveloped in the sheer blackness of a veritable hell, a new and terrible danger came upon us. This was the approach of the tidal wave caused by the final eruption, which occurred about 12.30 to 1 p.m. The wave reached us at 2 p.m. or thereabouts, and made the ship tremble like a sea-saw. Sometimes she was almost straight on end; at other times she heaved over almost on her beam ends. We were anchored and steaming up to our anchors as before, and as before we managed to escape destruction. All the passengers and the crew gave themselves up for lost, but there was no panic, and the captain handled the ship splendidly throughout. He received a gold medal from the Government in recognition of his indomitable courage in saving the ship and passengers. Well, you can fancy what it was like when I tell you that the captain was lashed with three ropes alongside the engine-room companion, while I was lashed down below to work the engines. The men were dashed from one side of the engine-room to the other.

"When we reached Angier we found no trace—neither a splinter of wood nor a fraction of stone—of the buildings of that once flourishing seaport. At Batavia the water was so dense from the floating lava, the deposit reached fifteen feet in depth, that we made our way to the shore on planks. Telobetong was closed for three or four months, and on our return to Achin we could not land our passengers. At Batavia the tidal wave had penetrated almost to the town, where, in the lower portion, the houses were flooded by the Kali Bezar (great river). Business was suspended, except by a few determined spirits who worked on by gaslight, so great was the alarm at the darkness and thunderous noises."

Such is the account of this eye-witness.

My wife and eldest child were on board the *Chyebassa*, the first merchant ship that went through the Sunda Straits after the eruption. A man-of-war preceded them, taking soundings. The child had to be shut up in her cabin to save her from seeing the many dead bodies that were floating about. A month afterwards,

when I went through the Straits, the sea was still completely covered with pumice stone and debris for many miles. The great wave caused by the eruption was felt half round the world, and even affected the tide in the Thames. The finely commuted debris cast up by the explosion gave rise, for three years, to weird sun glows— especially in Great Britain in the following November.

If these crude notes I have read to you to-night has the effect of turning the attention of any of my audience to this exquisitely lovely and most interesting country, I will be amply repaid.

PROCEEDINGS

OF THE

Royal Geographical Society of Australasia,

BRISBANE.

THIRTEENTH SESSION.

AUGUST 24, 1897.

The PRESIDENT, Hon. William Allan, M.L.C., F.R.G.S., in the chair.

There was a good attendance of members, and several ladies were present.

The minutes of the last Annual Meeting were read and confirmed.

A letter was read from the Adelaide Branch of the Society relating to the "Wells Fund."

The following new members were elected:—Messrs. Charles O'Reilly, L. G. Mirabel, and F. James.

The Hon. Librarian, Mr. E. Gore-Jones, reported the receipt of many exchanges, and certain donations from home and foreign societies.

The President made some appropriate remarks respecting the death of Sir Charles Lilley, one of the earliest members of the Society, and it was resolved that a letter of condolence, of which the following is a copy, should be written to Lady Lilley.

Brisbane,

To LADY LILLEY. *26th August, 1897.*

Dear Madam,—On behalf of our Council and Members, we desire to respectfully convey to yourself and family the most sincere sympathy of this Society in the irreparable loss you have sustained by the death of your distinguished and much honoured husband.

The late Honorable Sir Charles Lilley's name will be indissolubly associated with this Society as one of the Foundation members, and as one who presided over the meeting that gave it birth.

We again beg you to accept our most sincere sympathy, and remain,

Yours very respectfully,

WILLIAM ALLAN, *President.*

J. P. THOMSON, *Hon. Secretary.*

Mr. R. M. Collins read a very interesting paper upon "Early Explorations in the Logan and the Ascent of Mount Lindesay by Captain Logan in the year 1828." The paper was illustrated by maps and charts.

SEPTEMBER 9, 1897.

The PRESIDENT, Hon. William Allan, M.L.C., F.R.G.S., in the chair.

The minutes of the last monthly meeting were read and confirmed.

A letter (of which the following is a copy) was read from Lady Lilley, thanking the President and Council for their letter of sympathy upon the death of her husband.

Wickham Terrace,

September 10th, 1897.

Dear Sir,—I beg to acknowledge the receipt of your letter of the 26th August, and to ask you to convey to the Council and Members of the Royal Geographical Society of Australasia, Queensland, my sincere thanks for their kind expressions of sympathy with me in my great bereavement.

Yours sincerely,

S. J. LILLEY.

J. P. Thomson, Esq., Hon. Secretary, Royal Geographical Society, Brisbane.

The Hon. Librarian, Mr. E. Gore-Jones, reported the receipt of further exchanges and donations.

Mr. W. G. Cox, C.E., read a paper on "Explorations for Increased Water Supply to Western Australia," of which the following is an abstract:—

"In an account of explorations undertaken on behalf of the *Mining Journal*, Perth, and subsequently under the Department of Water Supply of Western Australia, for the purpose of gaining information with a view to increasing the water supply of the colony—both by boring for artesian water and by surface conservation of the rainfall—it is not, I think, necessary to treat fully upon the general geographical features of the colony. Explorations for underground water—a subject which, as I have remarked in previous writings, has been more or less overlooked by geographical explorers—are chiefly confined to the geology and general character of the country so far as the former can be observed, and especially the presence of elevated lands and their extent, collecting as they do the rainfall, which is the source of supply to the outcrop of the water-bearing rocks. In alluding, generally, to the chief characteristics of Western Australia, gold must take the foremost place. The magnetizing influence of that commodity has brought the colony into such prominence that probably the history of gold mining finds no parallel. The discovery of probably the most extensive and richest auriferous country of the world found the Colony of Western Australia not only the newest in a political sense, but the poorest in its physical advantages of soil and the natural conditions necessary for successful mining, pastoral, and farming pursuits. It was, in fact, over far the greatest portion of its area, forbidding in aspect, with interminable wastes of desert-like country unrelieved, in a general sense, by such extensive and rich pastoral lands as exist in the other Australian colonies. In the sense of a natural water supply—that of surface rivers—and even in average rainfall, it was also found to be deficient in a more pronounced manner than the sister colonies. In no respect have the physical shortcomings of the colony been more pronounced than in the

scarcity of a natural water supply. Although railway construction has been possible, gold production was next to impossible without a water supply, either natural or artificial. This has been the most trying and anxious element in the whole position of modern West Australia—a puzzle to the Government, and the despair of mine owners, although some alleviation has been afforded to the latter by sinking their mining shafts, in many of which more or less water has been obtained. The question of water supply appeared to resolve itself into two considerations, viz., those of conservation of surface water—the rainfall—and that of boring or sinking for a subterranean supply, or a combination of both. As there are doubts as to the existence of artesian water-bearing rocks under the goldfields proper, this phase of the subject, as regards the goldfields, need not be enlarged upon; it will suffice to point out that flowing artesian water has been obtained, in limited quantities, in many places on the fields from the formations of decomposed granitoid rocks, viz., Holecene, Pleistocene, Pliocene, Eocene. 'Speaking roughly as a whole,' says Mr. Woodward, the late Government Geologist, 'the country may be described as one large tableland, rising to an elevation of from 1000 feet to 2000 feet above sea level, and covered for the most part with sandy deposits, which have resulted from the denudation of the Desert Sandstone series, portions of which are still met with in places, notably, to the east and north-east of Coolgardie, either capping ridges of metamorphic rock or forming flat-topped hills when they consist of sandstones and clays. On this vast tableland there are areas of depression, into which the drainage of the country finds its way. They are called lakes, but are in reality only large salt flats, the metamorphic rocks which generally outcrop around them forming their foundations covered by a layer of clay. These so-called lakes are really river valleys, but they are so extensive, and the country is so level, and the rainfall so small, that the water rarely flows down them, but evaporates, leaving a thin layer of sediment and salt behind each season. Fortunately, however, for the purposes of gold production, there is practically a huge natural underground reservoir in sufficiently close proximity to the Kalgoorlie gold areas to allow of its underground conservation of water—with its anti-evaporative covering of a few feet only—being utilised for the benefit of the mining industries. The lake supply, there is every reason to believe, is a very large one, and the best and most economic mode of utilising it has been a most interesting problem to the engineers. It forms an important feature in the development of the Kalgoorlie mines, and may be taken to be a fair representative of others that exist here and there over hundreds of miles of the auriferous belt. The rain water has found its way into the crust of this auriferous region through fissures produced by eruptions and their attendant dislocations, and the forces generated in the eruptive period of the earth's history has produced so irregular and chaotic a condition of the rocks, that no man, be he ultra-scientific or one of the greatest practical experience, can tell the exact state or position of strata in the adjoining property, nor frequently, as a matter of fact, in his own. Nothing short of actual tests, by sinking, driving, or boring, can definitely settle *that* point. The broad fact is apparent that these goldfields are a water-

bearing country, entirely disposing of that depressing pessimistic view taken by so many people at the beginning of the development of the fields, with the type of which the pioneer artesian engineers of Australia have been only too familiar. Good serviceable water *has* been proved to exist and seems unlimited in quantity. It is saline, but that does not affect its usefulness for the purposes of gold mining, nor, when condensed, for human consumption. Having shown that there is a considerable supply of water available from subterranean sources, and that it is being obtained in increasing quantities for the purpose of crushing and reducing the ore, and for general mining purposes, it now follows that a description should be given of the mode of rendering this water, which is saline, fit for the use of man and beast; this is done by condensing it. It is very clear that had this resource not been availed of, gold mining could not have been carried on. That which must have appeared to the pioneers of West Australian gold mining to have been almost a hopeless condition of things—there being little or no rain water, and that which was found in sinking the mining shafts proved to be saline, and, therefore, unpotable—has been so altered and improved, that the first crude, unsatisfactory condensers on a small scale, have developed into what is probably as advanced and perfect apparatus as can be found in any part of the world. The most approved condensing plants are used; they are on the multiple effect system, similar to those in use at sugar refineries and at the great condensing plants at Peru and the Red Sea, where very large distilling installations have been put up. Some of the plants are capable of turning out 12,000 gallons of water per diem, and I think there can be no doubt that condensing has been brought by means of this machinery to a very high degree of perfection, and it is apparent that under existing circumstances, so far as human consumption and requirements are concerned, the difficulty of providing a supply of fresh water of superior quality has been temporarily surmounted. So far as condensing is concerned, I think most civil engineers will admit that this mode of providing potable water for the public is new to them, and certainly to those of them who have had the privilege of seeing its development; even at this early date in the history of the West Australian goldfields it is a revelation. To those engineers who have been engaged in obtaining underground supplies of water in the driest parts of the interior of Australia comparison is unavoidable, to make between the condition of life in the back blocks of the pastoral districts—particularly the cattle stations—and that of the mining community of West Australia. In the former the surface water procurable is, as a rule, of the most unwholesome and execrable character. In the latter the boon of the good condensed water they obtain is inestimable, but I am afraid that to those who are not in a position to make the comparison it is not valued as it otherwise would be; it might be said that neither the experience nor the comparison is required, but the fact remains, nevertheless. The next sequential phase of this subject of an increased water supply to the colony is that of artesian supplies. Had nature bestowed upon West Australia equally as extensive and valuable pastoral

lands as those of the eastern colonies, the question of an increased water supply would have been paramount years ago, and would have been accentuated since the colony obtained its political constitution. In the eastern colonies the need of additional supplies for pastoral purposes and internal traffic necessitated every effort being made to procure them, and although a great deal of unaccountable apathy was shown for years on the part of the Governments, their professional engineering advisers, and the pastoralists—particularly in New South Wales and Queensland—in procuring deep artesian water supplies, it has been amply proved, within recent years, that these supplies form, probably, with all due consideration of gold production, the most valuable assets the colonies possess. In the case of Queensland, especially, the supplementary addition to the uncertain rainfall is already enormous in volume, of inestimable value, and, in respect to the outflow from individual bores, by far the largest in the world. All that extensive area of country lying between the west and south-west coast and the Darling Ranges, has been recently proved to afford, by boring, large supplies of true artesian flowing water of the highest quality.' Mr. Cox then proceeded to give an account of the progress of boring for artesian water in various districts of Western Australia, describing the geological features of the localities, and stated that further search for artesian water will be made. It was natural that those tests should be made, at first, near the centres of population. Lands are, however, being taken up for pastoral, farming, and fruit growing on a surprisingly large scale in other parts of the colony. The population is increasing fast; markets extensive are, therefore, being formed, offering increased inducements to enterprising producers. Experienced pastoralists and agriculturists from the eastern colonies are securing the best lands available, especially in the Kimberley, Gascoigne, York, Northam, Bunbury and Albany districts. Further boring tests for underground water will necessarily be made in these inland districts in which—instead of consisting, as was supposed, of sandy level wastes—there are extensive ranges which act as collectors, during a fair rainfall, of the higher waters producing considerable streams at their base. The settled northern, or pastoral, districts are well watered. Little has been done in surface conservation, the occupiers depending upon springs, streams, and shallow wells. The stations are, as a rule, worked by native labour, and a native can water his flock of about a thousand with a bucket and rope. Many of these shallow supplies have been opened up in the Murchison district, the runs being faced so that the stock can walk down to the water themselves. Although there is not, as yet, any definite geological information available regarding most of the inland country, it may be safely assumed that the partial geological examinations already made indicate that more or less success may be expected. Another source of supply, which applies to the whole colony, is that of surface conservation. In an engineering sense this is a large subject; in its application to the peculiar requirements of the goldfields a most important phase of the subject. There are few districts that do not afford by their undulating character tes for a made reservoir where the declination of the

catchment areas, although less favourable than in hilly country, afford, nevertheless, a fall for the water. It may be said, in fact, that any locality that is not absolutely flat is available for the purpose. Many reservoirs of this kind have been made during the last few years by the Government, especially in the extended gold areas of the colony. The following are particulars, from official sources, of four such reservoirs, which will show their capacity and the quantity of water impounded during the year ending 30th November, 1896:—

Keen's Soak	..	..	2,663,000 gallons.
Kararawagle	..	..	5,819,000 ,,
Boorabbin ..	..	..	1,406,000 ,,
Woolgangie	..	..	232,000 ,,
			10,120,000 gallons

It will be seen from the above, which is amply confirmed by private reservoirs and the enormous accumulations of fresh water which take place after a heavy rainfall in the lakes of the goldfield areas, how large a quantity of water it is possible to impound even in this dry climate, and that the quantity actually accumulated during a year in the Government reservoirs approximated very closely to the total capacity of the reservoirs, viz., in round figures 10,000,000 gallons, the capacity of the four reservoirs named being 12,000,000 gallons. These figures, I think, speak volumes for the possibilities of surface conservation, even when the sparse yearly rainfall, of an average of only five inches, is taken into consideration. As I have said, money will do almost anything in engineering, and it is not difficult to conceive large, really well constructed conservation reservoirs in the various goldfields, so efficiently and thoroughly well made, that the gathering capacity of the catchment areas may be rendered as effective as possible, the reservoirs themselves be made soakage proof, and by sufficient depth being given to them evaporation be reduced to a minimum. On some of these goldfields, and it must be understood that these remarks do not apply to those of Coolgardie and Kalgoorlie alone, but also to Kimberley, Pilbarra, Ashburton, Murchison, Yalgoo, Yilgarn, and Dundas goldfields covering an area of many hundreds of miles in extent, there are naturally good sites for storage reservoirs. Others are less favourably situated, in which case, failing an adequate subterranean supply of fresh water, artificial conservation will, I think, without doubt, sooner or later be adopted. It is hoped that the above short account of the position of West Australia as regards an increased water supply may prove an acceptable addition to the records of the Royal Geographical Society. The information has been obtained by dint of a great deal of arduous travelling—over some fifteen hundred miles—of a specially exploratory nature. The engineering questions have not been entered into in detail, as it would be out of place to do so before a geographical society; they were fully treated by me in the Perth *Mining Journal*. In conclusion, West Australia is in a state of transition; vast strides are being made in the development of the varied resources of the

colony, due mainly to the phenomenal discoveries of gold over an extent of country which has, I believe, not been even approximated to by any other country in the world. The vast stretches of apparently barren desert country known to the brave early explorers is giving place to flourishing mining camps, destined ere long to rise to the dignity of regular organized townships. The pastoral, agricultural, and fruit-growing industries are increasing rapidly in order to supply as rapidly increasing markets, and by the application of the experience, knowledge, and capital of not only the eastern colonies but of Europe and America—which the colony is fortunate in being able to command —her future appears so clearly defined, that from having been the 'Cinderella' of the group, it seems quite probable that she will, before many decades, attain a quite royal prominence by outstripping her sisters, both in population and wealth."

NOVEMBER 13, 1897.

The PRESIDENT, Hon. Wm. Allan, M.L.C., F.R.G.S., in the chair.

There was a good attendance of members, and several ladies were present.

The minutes of the last monthly meeting were read and confirmed.

The following new members were elected :—Messrs. Kendall Broadbent and John Herbert Durant.

The Hon. Librarian, Mr. E. Gore-Jones, reported the receipt of further exchanges and donations, the latter including gifts from the Hon. A. C. Gregory and Mr. Oxtoby.

The President informed the meeting that the medal of the Incorporated Society of Science, Letters and Art of London had been awarded to the Hon. Secretary, Mr. J. P. Thomson, "for merit in science."

Mr. E. Gore-Jones read an exceedingly interesting and able paper by Captain W. C. Thomson, entitled "A Review of Arctic Exploration." The paper was illustrated by maps and charts, some of which were of ancient date.

APRIL 28, 1898.

The Hon. Treasurer, Mr. James Irving, M.R.C.V.S.L., took the chair in the absence of the President on account of illness.

The minutes of the last monthly meeting were read and confirmed.

The Hon. Librarian, Mr. E. Gore-Jones, reported the receipt of a large number (201) of publications, in exchanges and donations, from home and foreign societies.

Captain Gross read a paper by Mr. Kendall Broadbent, on the "Geographical Range of some Birds which breed within the Arctic Circle." Some beautiful specimens of stuffed birds were exhibited by way of illustration.

Captain Gross gave an oral account of the geographical distribution of some shells, and at the same time exhibited some rare specimens from his own collection.

JUNE 2, 1898.

The Vice-President, Major A. J. Boyd, in the chair.

The minutes of the last meeting were read and confirmed.

A letter was read from the President regretting his absence from the meeting.

A memorandum descriptive of the origin and development of the Imperial Institute was laid upon the table.

The Hon. Librarian, Mr. E. Gore-Jones, reported the receipt of further exchanges and donations, the latter including a large number of the monthly notices of the Royal Astronomical Society, which had been presented to the Society by Captain Almond, with an intimation that he would forward the numbers of such periodical as he received them.

The Hon. Secretary, Mr. J. P. Thomson, read a paper by Mr. R. H. Mathews, on "Aboriginal Initiation Ceremonies," and subsequently introduced the subject of the recent breach in Stradbroke Island, at Jumpinpin, with reference to which he read the following report by the Inspector of Fisheries to the Chairman of the Marine Board (Captain T. M. Almond); the observations of the latter upon the same, and a memorandum by the Hon. A. C. Gregory:—

Marine Board Office,
Brisbane, 20th May, 1898.

Sir,

"In obedience with your directions I have the honour to state that I have inspected the new channel recently broken through Stradbroke Island at Jumpinpin.

On leaving the main Southport steamship channel, a little past Rocky Point, and proceeding along the South shore of Tabby Tabby and Cobby Cobby islands, and the North shore of Kangaroo Islands, a strong current was experienced which proved to be the flood tide coming in from a North-easterly direction through the recently broken entrance of Swan Bay. While proceeding along the channel, the least depth of which was found to be 4ft. 6in. at low water, large quantities of black soil were noticed to be washed away from the banks of Mangrove Islands, portions being entirely denuded of trees and grass. On entering Swan Bay from this entrance, which will now be the main channel, we continued with deep water into the old Jumpinpin beaconed channel, which was crossed, and on the following morning a channel was seen cut out to sea in a N.E. by E. direction. High water occurred on the 18th, half-an-hour before high water at the Pile Light, and high water the following morning was at 8.15 a.m., and low water at 2.10 p.m. As the sea appeared to be smooth outside, an opportunity was taken of crossing the channel outside the inner break, close to the Heads. A bank was found to have formed which dried at low water right in front of the entrance across Swan Bay; the northern portion of Swan Bay or Broadwater, above the break, has numerous sandbars, shallow water, and pandynus trees washed from Stradbroke Island, forming many dangerous snags to boats coming down the Canaipa Channel.

The oyster banks at entrance to Swan Bay do not seem to be injured in any way, but the sea appeared to have broken through over the sandhills at the

head of the bay without making a permanent channel. I expect that a great stimulus will be given to oyster culture by the break allowing the salt water to mix with the Logan and Coomera waters amongst the islands fronting Swan Bay.

The old Canaipa Channel was passed through and was found to consist of numerous sandbars which appeared to have a great influence on both the speed and direction of the flood tide; the flood in the Canaipa Channel did not appear to have anything like the speed of the flood tide met in the Tabby Tabby Channel.

The flood tide of the Tuleen break meets the Southport flood tide at Rocky Point, and the South Passage flood tide, two miles above Willes' Point, Russell Island. In my opinion the influence of the new passage will equalise the height of tides in the Broadwater, unless heavy Easterly or South-easterly weather backs them up."

I have, etc.,

The Chairman,
Marine Board.

(Sgd.) CECIL S. FISON,
Inspector of Fisheries.

Marine Department,
Brisbane, 20th May, 1898.

Sir,

"After consulting with the Inspector of Fisheries, and reading his report, I find that the main channel used by vessels trading to Southport remains unchanged, and there is no reason to anticipate any changes that will be prejudicial to navigation in the future.

The effect of the opening of the new channel will be to alter the localities of the meeting of the tides, but no important alteration in the tidal range will take place, and the times of high water at the new opening will closely approximate to the time of high water at Southport Bar.

The formation of a Bar may be anticipated at the entrance to the new channel, and small changes in the narrow channels on the Stradbroke side may be expected. Any development resulting from the changes which have taken place will be closely watched by the officer representing this department at Southport, and it is contemplated to make a re-survey of the passage inside Stradbroke should it be found necessary."

The Under Secretary,
Treasury.

(Sgd.) T. M. ALMOND,
Portmaster.

The following memorandum was received from the Hon. A. C. Gregory, M.L.C.:

"Stradbroke Island has apparently been formed by the deposition of sand along a line of reef with some small islands and rocks along its Eastern shore, and has been gradually extended parallel to the coast Southwards to Southport where the outer edge of the rocky reef approaches so closely to the rocky base of the mainland as to almost join at Southport.

The open space between the island and the mainland is of considerable breadth at the Northern part, and as the flood tide and great ocean current

is from the North, it has kept an open passage between the island and mainland to where it breaks out at Southport. As the flood tide flows in at both the North and South ends of the channel, and they meet at a point about two-thirds of the length from the North end, there has been a great deposit of sand and silt at this part, which has been increased by the floods coming from the Logan and other rivers, forming low islands and mudbanks covered with mangroves, so that the present channels, which remain navigable, are only kept open by the occasional extra high tides in Moreton Bay at the North end, causing the tides to meet much nearer Southport.

Stradbroke Island appears to have had its Southern extreme, in remote times, a little North of the break which has just occurred, but the natural tendency of the currents from the North has resulted in the formation of a sandspit along the outer side of the reef extending to the Southport entrance, where it would probably have joined the mainland had it not been that the floods from Nerang Creek have forced a way through to the ocean, though the sandspit continues several miles further South to Burleigh Heads, but instead of open water between it and the mainland the space is occupied by a marsh.

It is under these conditions that the recent severe storms have cut through Stradbroke Island, near the Jumpinpin and Swan Bay, and the question is, What will be the effect as regards the navigation of the channel from Moreton Bay to Southport?

In the first instance the flood tides will flow in from Moreton Bay, Southport, and the new opening, but their meeting will still be just North of Swan Bay, and the islands and channels near to Stradbroke Island will be greatly altered by the direct influx of the ocean; but the present navigable channel being close to the mainland will not be much affected for some time.

The general flow of the ocean current from North to South will cause the Northern side of the new opening to silt up and the Southern side will recede to the South and eventually be pushed South to the present South entrance, opposite Nerang Creek.

In the interval the channel between Stradbroke and the mainland will be much injured by deposits of mud and sand at the points where the tidal currents meet and cause dead water. The new entrance will be gradually moving Southwards, but will always have a bar of sand outside, and unsafe for vessels, except in very calm weather.

What period of years will elapse in the progress of these changes it is not possible to determine, but the changes in the sea coast and sand drifts is sometimes so rapid that near Cape Leeuwin the forests of Eucalypti have been completely buried within a year, and in other places ancient forests uncovered and laid bare after being covered by 150 feet of sand for perhaps a 100 years, judging from the amount of decay."

(Sgd.) A. C. GREGORY.

2nd June, 1898.

ANNUAL GENERAL MEETING.

AUGUST 11, 1898.

The President, Hon. Wm. Allan, M.L.C., F.R.G.S., in the chair.

His Excellency Lord Lamington, Patron of the Society, was present.

There was a good attendance of members, and a large number of ladies, including Lady Lamington, were also present.

It was resolved that the minutes of the last monthly meeting should be taken as read.

The President informed the meeting that the Hon. Secretary, Mr. J. P. Thomson, was suffering from a severe illness, and called on Mr. E. Gore-Jones to read a letter from that gentleman.

Brisbane,
August 10th, 1898.

To the HON. WM. ALLAN, M.L C., F.R.G.S.,
President Royal Geographical Society of Australasia, Brisbane.

" My dear Mr. President,

First of all, let me offer my most sincere thanks to yourself, and to my fellow officers of our Society, and to our Council, for warm sympathy extended to me during a dangerous illness, from which I have not yet recovered, notwithstanding the very excellent attention bestowed upon me by Dr. John Thomson.

I am greatly indebted to Mr. Gore-Jones for having kindly taken the Secretarial duties off my hands, and to Mr. de Vis for valuable assistance with editorial work. To all of you, indeed, I owe a deep debt of gratitude. To say that I most deeply grieve an enforced absence from our thirteenth anniversary meeting seems to me an empty statement, conveying no idea whatever of the actual state of my feelings. Although this is the first time absent from any meeting of the Society for thirteen years, it would be altogether too sanguine for me to hope for a similar unbroken record again. It is a great misfortune for me to be deprived of the honour and privilege of taking part in the reception of our distinguished and highly honoured Patron, whose countenance at our special functions has so greatly promoted our interests, and delighted our members and guests. Nor is it a less misfortune for me to have to deny myself the pleasure of listening to the highly interesting and instructive Presidential address by yourself, from whom I have received the greatest kindness and consideration. I thank the Executive Officers and Council for the encouragement which I have received at their hands in my secretarial work during the past session, and I wish the greatest measure of success to the meeting."

I am, very faithfully yours,
(Sgd.) J. P. THOMSON, *Hon. Sec.*

The President then called on the Hon. Treasurer, Mr. James Irving, for his financial statement

THE HONORARY TREASURER IN ACCOUNT WITH THE ROYAL GEOGRAPHICAL SOCIETY OF AUSTRALASIA, QUEENSLAND.

Dr.

		£	s.	d.	£	s.	d.
1897.							
July 1	—To Balance :—						
	Royal Bank	1	15	3			
	Govt. Savings Bank ..	43	15	1			
	Cash		1	4			
					45	11	8
1898.							
July 1	,, Subscription, Entrance Fees, &c.	86	5	2			
	,, Interest on Govt. Savings Bank Deposit	1	5	9			
	,, Withdrawal from Royal Bank for deposit in Govt. Savings Bank	12	10	0			
					100	0	11
					£145	12	7
1898.							
July 1	—To Balances on hand, viz.:—						
	In Govt. Savings Bank	57	10	10			
	,, Royal Bank ..	8	19	5			
					£66	10	3

Cr.

	£	s.	d.	£	s.	d.
1897-98.						
By Advertising and Reporting ..	3	9	6			
,, United Service Institution, Attendance, &c.	10	0	0			
,, Sundry Expenses, Meetings, Exchanges	2	8	11			
,, Library	1	11	7			
,, Postage, Stamps, and Papers..	2	16	11			
,, Printing, Stationery, Binding, &c.	32	7	2			
,, General Account	12	0	9			
,, Fire Insurance	1	17	6			
,, Deposit in Govt. Savings Bank	12	10	0			
				79	2	4
,, Balance						
In Govt. Savings Bank ..	57	10	10			
,, Royal Bank	8	19	5			
				66	10	3
				£145	12	7

Brisbane, *13th July*, 1898.

JAMES IRVING, V.S., *Hon. Treasurer.*

Examined with bank books, vouchers, &c., and found correct.

ALEX. MUIR, *Auditor.*

Brisbane, 13*th July*, 1898.

Report of Council—Session 1897-98.

To the Members of the Royal Geographical Society of Australasia (Queensland).

Ladies and Gentlemen,—The Council of this Society have much pleasure in presenting the Thirteenth Annual Report of its operations.

Membership.—Of the 139 members on the Roll at the close of the last session, one of the earliest and most distinguished has been removed by death—allusion is made to the late Sir Charles Lilley, whose valuable aid rendered to the Society at the time of its inception will not be readily forgotten.

The Honorary Diploma of Fellowship has been conferred on His Excellency Lord Lamington in recognition of his undeniable reputation as a traveller in the East; and it is only gracious to add that his lordship, as Patron, has by his presence at each of the annual meetings done much to promote the interest attaching to the proceedings of the Society.

The Council takes this opportunity of recommending the appointment of Mrs. J. P. Thomson as a corresponding member on account of her valued services to the Society, such appointment to take effect retrospectively upon the adoption of this Report.

Funds.—The Hon. Treasurer's Statement denotes a satisfactory and improving state of things in relation to the funds of the Society.

Meetings of Council.—The first meeting of the Council during the session was held on the 11th day of August, 1897, and since then there have been eleven such meetings.

Meetings of Members.—The usual monthly meetings of Members were held on the 24th August, 16th September, 11th November, 1897; 28th April and 7th June, 1898. And the following is the list of papers read:—"Early Explorations on the Heads of the Logan, and Captain Logan's Ascent of Mount Lindesay, 1828;" "Account of Explorations for an increased Water Supply to Western Australia;" "A Review of Arctic Exploration;" "The Geographical Range of some Birds that Breed within the Arctic Circle;" "Aboriginal Initiation Ceremonies;" "The Recent Breach at Stradbroke Island."

Publications.—The twelfth volume of the Proceedings and Transactions of the Society was completed and circulated at an early stage of the session, and has apparently met with the cordial approval of members. Its contents, as may be seen, comprise matter culled from the papers read at the monthly meetings; the anniversary address of the former President; and some important communications from Sir Wm. MacGregor relating to his journey across New Guinea and the re-ascent of Mount Victoria; which events were fully discussed at a meeting of Members specially convened on the 30th October, 1896.

The interest evoked by the Society's publication is perhaps best attested by the continued demand for former and current numbers coming from kindred societies in other parts of the world.

LIBRARY.—During the session the library has continued to grow so rapidly that its dimensions, not to speak of the future, make the exigencies of space a pressing consideration. The binding of the various periodicals, or some of them at least, would also be a most desirable improvement.

In exchanges and donations, 548 publications have been received during the year, representing contributions from all quarters of the globe, and including some large and well-bound volumes of various annual reports from the United States of America.

Amongst the donations the following should be specially mentioned, viz.:—"The Picturesque Atlas of Australia," in three volumes, presented by Hon. A. C. Gregory; the monthly notices of the Astronomical Society, the numbers of which Captain Almond, as he receives them, generously hands over to the Society; the work of Thomas Worsnop on the "Aborigines of Australia," the gift of Mr. Robert Fraser, M.L.A.; and a complete Atlas of the World, published in the year 1766, is the interesting donation of Mr. Oxtoby.

A new and carefully arranged catalogue has been commenced, and the contents of the previous one have been embodied therein, in order that members may the more speedily find the reference to any publication they are in quest of.

In conclusion the Council desire to congratulate members on the steady development of the Society, and the expansive nature of its relations with the kindred societies of other countries.

For the Council, E. GORE-JONES,
Acting Hon. Sec.

Mr. E. Gore-Jones moved, and Mr. Alexander Muir seconded, the joint adoption of the report and financial statement.

The President then delivered his annual address on the subject of the recent history of "Java, and the Manners and Customs of its Inhabitants." The address was illustrated by a large coloured map of the country.

Lord Lamington moved a vote of thanks to the President for his address, which, he said, could not have been delivered in a more interesting manner. Although so close, Java was not a country that came in for description in Australia. He (Lord Lamington) had a cursory glance at the island when coming through with Lady Lamington to Australia. What had struck him in the address was the picturesque description of the dress of the people, the eruption, and the temples, and he quite endorsed what had been said about the wonderful sculptures in a country that was well worth visiting. He himsel had worn the serong, which was most comfortable in that climate, and his lordship here explained that there were no punkahs in Java, because of the prevailing impression that they made the ladies bald. (Laughter.) He did not agree with what had been said about the excellence of the Dutch Government, and instanced the trouble with the natives in the neighbouring islands, which would soon have been overcome under British rule, and echoed the regret expressed that the labours of Sir Stamford Raffles had not been borne out, and the island kept under British rule. He had heard, too,

that there was far greater liberty in dealing with the natives than would be allowed by a British Government, and a factor in its success was the presence of many British as plantation owners. Their thanks were due to Mr. Allan for the labour he had gone through in the preparation of the interesting paper, and also in fulfilling his position as President. The motion having been seconded by Major A. J. Boyd, who spoke at some length, was carried by acclamation.

The meeting then proceeded to the election of officers for the coming session, with the following result:—President, R. M. Collins, M.L.A.; Vice-President, J. Irving; Hon. Secretary, J. P. Thomson; Hon. Treasurer, Alex. Muir; Hon. Auditor, C. W. de Vis; Hon. Librarian, E. Gore-Jones; other Members of the Council: the Hon. A. C. Gregory, the Hon. W. Allan, Major A. J. Boyd, Messrs. W. Jones, C. B. Lethem, R. Fraser, M.L.A.

The Hon. Wm. Allan then vacated the chair, which was taken by the newly elected President, who moved that a vote of thanks be accorded to His Excellency for his attendance, which was carried by acclamation.

Lord Lamington said it was a pleasure to be present on such an occasion, and took the opportunity of complimenting Mr. Allan on his very excellent cartography. Mr. Collins was entitled to his position on the best basis of all, that of an Australian geographer, and he knew his right to that, as he had taken him (Lord Lamington) into some almost inaccessible places crossing the Macpherson's Range. (Laughter.)

Mr. Collins then moved a vote of thanks to the retiring council, which was responded to by Mr. Gore-Jones, more particularly on behalf of Mr. Thomson.

Refreshments were then served in an adjoining chamber.

The Royal Geographical Society of Australasia,

QUEENSLAND.

DIPLOMAS OF FELLOWSHIP.

(*See Resolution on page* 3 *of cover.*)

The following gentlemen have been awarded the Diploma of Fellowship :—

Honorary:

His Excellency Sir William MacGregor, K.C.M.G., C.B., M.D., D.Sc., Hon. F.R.S.G.S., etc.

Hon. A. C. Gregory, C.M.G., M.L.C., F.R.G.S., etc.

Major A. J. Boyd, Q.A.

His Excellency The Right Hon. Lord Lamington, K.C.M.G., B.A., F.R.G.S., Hon. F.R.S.G.S., etc.

(*b*) On *Application* :—

James Irving, Esq., M.R.C.V.S.L.

J. A. Baxendell, Esq.

William Jones, Esq.

Charles Battersby, Esq.

LIST OF MEMBERS.

(P) Members who have contributed papers which are published in the Society's "Proceedings and Transactions." The numerals indicate the number of such contributions.

(PP) Past President.

A dagger (†) prefixed to a name indicates a member of the Council.

Life members are distinguished thus (*).

Should any error or omission be found in this list, it is requested that notice thereof be given to the Hon. Secretary.

Foundation Members:

Atkinson, James R., J.P., Lic. Sur., Ipswich, Queensland.

Daniell, E. N., Survey Department, Brisbane.

Gailey, R., J.P., Courier Building, Brisbane.

P7PP†Gregory, Hon. A. C., C.M.G., M.L.C., F.R.G.S., &c., Mary Street, Brisbane.

Marks, Hon. C. F., M.D., M.L.C., Wickham Terrace, Brisbane.
*Moor, T. B., F.R.G.S., F.R.S. Tas., Strahan, West Coast, Tasmania
P1†Muir, A., Hon. Treasurer, J.P., Queen Street, Brisbane.
P26PP†Thomson, J.P., Hon. F.R.S.G.S., &c., Hon. Secretary, "Alsatia," Dornoch Terrace, South Brisbane.

Members :

Ahern, John, L.S., Charters Towers, Queensland.
Aldridge, H. E., J.P., "Baddow," Maryborough, Queensland.
P1PP †Allan, Hon. W., M.L.C., F.R.G.S., "Braeside," Dalveen, Queensland.
Allan, James, J.P., Messrs. Allan and Stark, Queen Street, Brisbane
Almond, T. M., F.R.A.S., Marine Department, Brisbane.
Anning, John, J.P., Charlotte Plains, Queensland
Bartholomew, T., J.P., Woombye, North Coast Line, Queensland
Battersby, C., J.P., F.R.G.S.A., (Q.), Georgetown, Queensland
Baxendell, J. A., F.R.G.S.A., (Q.), Downs Grammar School, Toowoomba
Bland, Elliott, representing the B. I. & Q. A. Coy., Mary Street, Brisbane.
Bonar, W. M., J.P., Herberton, Queensland
P5 †Boyd, Major, A. J., Q.A., F.R.G.S.A. (Q.), Gatton
Brown, D. L., J.P., Armour and Co., Edward Street, Brisbane
Broadbent, Kendall, the Museum, Brisbane.
Cameron, W., Geological Survey Office, Brisbane
*Campbell, A., J.P., Glengyle Station, Birdsville, Queensland
P2 *Collins, R. M., M.L.A., President, Tamrookum, Beaudesert, Queensland
P2 Cox, W. G., C.E., Queen Street, Brisbane
*Crorkan, T., J.P., Northam, Western Australia
Cunningham, J. S., Mundingburra, Townsville, Queensland
Cunningham, M. W., J.P., Rannes, River Dee, *via* Rockhampton, Queensland
De Vaux, R. H., Birdsville, Queensland
P1 †De Vis, C. W., M.A., The Museum, Brisbane
P1 Embley, J. T., Lic. Sur., Thursday Island, Torres Straits
Fenwick, John, J.P., Edward Street, Brisbane
Finlay, Miss Laura Lucie, 17 Craven Hill Gardens, Hyde Park, London
Foot, J. A., J.P., Warrinilla, Rolleston, Queensland
Forster, C. E., J.P., Goondi, Johnstone River, Queensland
Frackelton, Rev. W. S., Ph.D., etc., Presbyterian Manse, Ann Street, Brisbane
†Fraser, Robert, M.L.A., Elizabeth Street, Brisbane
Fullerton, Alex. Young, B.A., L.R.C.P., M.R.C.S., Dalby, Queensland
P1 PP Griffith, His Honour Sir S. W., G.C.M.G., M.A., etc., Chief Justice, Brisbane.
Gregory, Edmund, J.P., Government Printer, Brisbane
Gross, G., Boys' Grammar School, Brisbane
Haldane, A. C., P.M., Herberton, Queensland
Harbord, H. H., J.P., Maytown, Queensland
*Hardcastle, F. W., J.P., Headingly, Boulia, Queensland

Harkness, J. M., Messrs. Mofflin, Rickards & Co., Petrie's Bight, Brisbane
Hartley, S. W., J.P., Rockhampton, Queensland
Hemmy, H. J., L.S., Kwala, Lumpor, Salangor, Straits Settlement
Hertzberg, A. M., J.P., Hertzberg and Co., Charlotte Street, Brisbane
*Holt, W. H., F.R.C.I., Wealwandangie, near Springsure, Queensland
Hughes, E. F., Dental Rooms, Treasury Chambers, George Street, Brisbane
Innes, S. L., L.S., Cresswell Downs, Camooweal, Queensland
†Irving, J., M.R.C.V.S.L., J.P., F.R.G.S.A. (Q.), Vice-President, Ann Street, Brisbane
†Jones, E. Gore, Hon. Librarian, Treasury Buildings, Brisbane
†Jones, Wm., J.P., F.R.G.S.A., (Q.), Stephens Street, South Brisbane
Kemnitzer, K., Grammar School, Townsville, Queensland
Kenealy, P., Albion, Brisbane
Kennedy, A. S., Kingsholme, Fortitude Valley, Brisbane
Klugh, C. R., J.P., Longreach, Queensland
Lamington, His Excellency The Right Hon. Lord, K.C.M.G., etc., Government House, Brisbane
Larsen, Major V., Railway Department, Roma Street, Brisbane
Lawson, R. H., Police Department, Treasury Buildings, Brisbane
†Lethem, C. B., C.E., Clayfield, Brisbane
Lloyd-Owen, E., C.E., Ipswich, Queensland
Macintosh, H., Survey Office, Brisbane
*Mathieson, John, Railway Commissioner's Office, Melbourne, Vic.
Matthews, G. S., Imperial Insurance Co., Queen Street, Brisbane
*McConnel, J. H., J.P., Cressbrook, Queensland
McDonald, A. B., J.P., Grosvenor Downs, Clermont, Queensland
McMorrison, D. N., J.P., Camooweal, Queensland
Moran, R. W., Police Magistrate, Tambo, Queensland
Mulligan, J. V., J.P., Limestone, Queensland
Munro, James, J.P., Webster and Co., Mary Street, Brisbane
Musgrave, Hon. A., M.L.C., Port Moresby, British New Guinea
Mylne, Thomas, J.P., Treasury Buildings, Brisbane
Nelson, Right Hon. Sir H. M., P.C., K.C.M.G., Legislative Council, Brisbane
Nicholas, H. C. R., J.P., Argentine, Queensland
O'Donohue, M., C.P.S., Bowen, Queensland
O'Reilly, Charles, Dornoch Terrace, South Brisbane
Owen, Capt. E. C., Geological Survey Office, Brisbane
Pennefather, C. E. de F., Prisons Department, William Street, Brisbane
Percy, H. L. H., J.P., Diamantina Lakes, Winton, Queensland
Philp, J., J.P., Melrose Park, Gatton, Queensland
Radcliffe, O., Inspector of Schools, Maryborough, Queensland
Richardson, W. H., London, Ontario, Canada
P1 Roberts, W Bertrand, M.A.I.M.E., M.R.A.S., Ulu, Pahang, Malay Peninsula

Rutlidge, Charles Schaefer, 11 Australian Chambers, Brisbane
Starcke, A., Land Commissioner, Rockhampton
Steuart A., Queensland National Bank, Brisbane
*Stevens, E. J., J.P., Southport, Queensland
Street, Wm., Jane Street, South Brisbane
Sword, T. S., J.P., Land Board, Brisbane
P1 Thistlethwayte, D. S., C.E., Clayfield, Brisbane
*Thomas, J. S., Bondi, Sydney, N.S.W.
Thompson, J. H., Clayfield, near Brisbane
Thomson, A. A., Bay View, Heely Street, Paddington, Sydney, N.S.W.
P3 Thomson, Capt. W. C., Swan Hill, Brisbane
Trouton, W. J., J.P., Queen Street, Brisbane
Walker, Edgar W., J.P., New Zealand Ins. Co., Queen Street, Brisbane
*Walsh, Rev. W. M., P.P., St. Joseph's, Townsville, Queensland
Walsh, A. D., Dalgety and Co., Elizabeth Street, Brisbane
Walsh, Nugent, Bremer Bridge, Ipswich
Waraker, E. M., Staff Surveyor, Queensland
*Weedon, W., Oxley, near Brisbane
*Weedon, S. H., C.E., L.S., "Yatala," Bent Street, North Sydney, N.S.W.
Whalley, C. E., A.J.S. Bank, Wauchope, N.S.W.
Wheatcroft, John, M.A., The Grammar School, Rockhampton, Queensland
P1 Williams, Capt. J., c/o Burns, Philp and Co., Sydney, N.S.W.
Wilson, J. S., Lands Department, Brisbane
Wilson, W. A., J.P., Tarong, *via* Jondaryan, Burnett District, Queensland
Winter, Hon. F. P., C.M.G., Port Moresby, British New Guinea

Honorary Members:

General Sir H. W. Norman, G.C.B., G.C.M.G., etc., London, England
Lady Norman, London, England
The Right Hon. Lord Stanmore, G.C.M.G., etc., London, England
P2 Douglas, Hon. John, C.M.G., F.R.G.S., Thursday Island
Hodgkinson, Hon. W. O., F.R.G.S., Coolgardie, W. Australia

Honorary Corresponding Members:

His Excellency Sir William MacGregor, K.C.M.G., C.B., M.D., D.Sc., Hon. F.R.S.G.S., etc.
John Tebbut, Esq., F.R.A.S., etc., etc., Private Observatory, "Peninsula," Windsor, N.S.W.
Charles Gauthiot, Member du Counseil Supérieur de Statistique et de la Commission des Voyages et Missions Scientifiques, Secretaire Générale de la Societé de Géographie Commerciale, Paris
H. R. Mill, D.Sc., F.R.S.E., F.R.G.S., F.R.S.G.S., Royal Geographical Society, London

S. P. Smith. F.R.G.S., Surveyor-General, Wellington, New Zealand
H. C. Russell. B.A., C.M.G., F.R.S., F.R.A.S., F.R. Met. Soc., The Observatory, Sydney, N.S.W.
Capt. H. C. Everill, F.R.G.S.
Sir Sandford Fleming, K.C.M.G., LL.D., C.E., Ottawa, Canada
Major J.W. Powell, Hon. F.R.S.G.S., etc., Director Bureau of Ethnology, Washington, D.C., U.S.A.
Hon. W. T. Harris, Ph.D., LL.D., Commissioner of Education, Washington, D.C., U.S.A.
R. H. Mathews, Esq., Licensed Surveyor, Corresponding Member of the Anthropological Institution of Great Britain, Parramatta, N.S.W.
Mrs. J. P. Thomson, " Alsatia," Dornoch Terrace, South Brisbane

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SUPPLEMENT.

Re the Discovery of the Purari River, British New Guinea.

[The Council of the Royal Geographical Society of Australasia, Queensland, has authorised the publication of the following correspondence from His Excellency Sir William MacGregor, Lieutenant-Governor of British New Guinea, concerning the discovery of the Purari River.—J. P. THOMSON, Hon. Sec.]

[COPY.].

BRISBANE, 24/10/98.

The Secretary,

ROYAL GEOGRAPHICAL SOCIETY OF AUSTRALASIA
(Queensland Branch).

DEAR SIR,

Before I finally leave this part of the world, I wish to deposit with your Society certain papers that will be sufficient for all time to establish the historical fact that the Rev. James Chalmers was the original discoverer of the Purari River. This is necessary on account of a printed slip, addressed in 1895 by Mr. Theodore Bevan to the Hon. Robert Philp, M.L.A., in which the former calls on the latter to invite an explanation from myself for having called Mr. Chalmers "the original discoverer of the great Purari River." Neither Mr. Philp nor any other person has asked me for any explanation. As, however, Mr. Bevan has no hesitation in saying "the statement is distinctly untrue," I now enclose herewith clear proof that it is an uncontrovertible truth. There are scores, hundreds of other witnesses available to substantiate it, leaving aside altogether the statements of the Rev. James Chalmers, which of themselves will convince any unprejudiced person.

1. I enclose a copy of Friederichsen's map, published in Hamburg in 1885, about two years before Mr. Bevan visited the Purari. You will notice on that map, prepared and published abroad, the names of the Alele, Aivei, and Panaroa, and in a

dotted line the Wickham. This shows beyond the shadow of a doubt that these mouths of the Purari were well known to geographers years before Mr. Bevan ever saw them.

2. I enclose copy of a letter supplied to myself by Captain Dubbins, a man whose veracity Mr. Bevan will not question. The original was addressed to the Secretary of your Society. This shows the origin of the data on which Friederichsen's map, as regards this river, is compiled, and that Mr. Chalmers was the head of the party that made the discovery which Captain Dubbins put upon this map. It would also seem from the note of Captain Dubbins that Mr. Bevan had heard of the discovery by Mr. Chalmers.

3. A copy of a note to myself by Mr. Hugh Milman, which leaves no reasonable doubt that Mr. Bevan knew of Mr. Chalmer's discovery, is also enclosed.

4. I enclose a solemn declaration, made by a native chief of Port Moresby who accompanied Mr. Chalmers on one of his visits to Maipua, where they slept after having sounded the Panaroa. This was before Mr. Bevan's arrival in New Guinea.

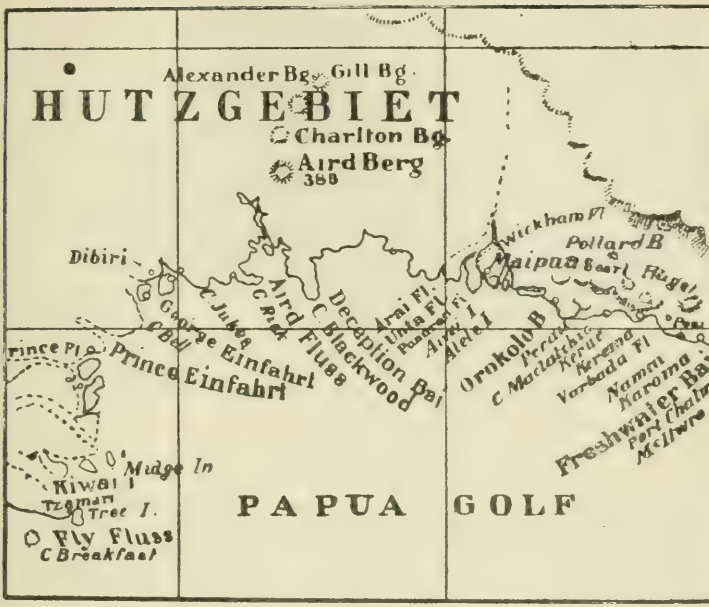
5. A solemn statement by Waburi, a Chief of Hanuabada, who accompanied Mr. Chalmers to a number of villages on the Purari Delta before Mr. Bevan went to New Guinea.

6. I enclose a reprint from *Petermann's Mitteilungen*, 1896, Heft 2, where, page 47, you will find the subject correctly and dispassionately stated by a Greek authority, whose only interest in the question is the one I myself possess—that the truth be established. It will be noted that the editor takes practically the same view of the question that I have done myself, viz.: "There can be no doubt that Chalmers has been the true (real) discoverer of the opening arms of the Purari, while Bevan, by travelling over the same, first furnished proof that they did not belong to the Fly River but were formed from a substantive river." I only wish to add that I did not inspire *Petermann's Mitteilungen*.

I have, etc., etc.,

WM. MACGREGOR.

EXHIBIT No. 1.



[Copy of a part of Friederichsen's Map of 1885, showing the Panaroa and other mouths of the Purari River].

(EXHIBIT No. 2).

[COPY].

"Yule Island, British New Guinea,

"Sir, "*June* 30*th*, 1896.

"As I understand that Mr. Theodore Bevan claims to have discovered the Purari River, I beg to state that in the year 1877, in company with the Rev. J. Chalmers, we discovered the mouths of that river, and as I described them, so they were afterwards marked on the Admiralty charts. Mr. Bevan could hardly have failed to observe them so marked; the positions may not have been strictly accurate, but there can be no doubt that it was the Purari River we saw. At the time I was master of the London Missionary steamer *Ellengowan*. Some natives on board at the time told us they were mouths of one river.

"I may also state that when Mr. Bevan was about to start in the *Victory*, Mr. Milman, who was then Government Resident at Thursday Island, asked me to accompany her to the coast, but I declined when I found he intended to explore this river, as I thought it probable Mr. Bevan might benefit by my experience and take all the credit to himself.

"I have the honor to remain,

"The Secretary, "Yours faithfully,

"Royal Geographical Society, "(Signed) H. DUBBINS.

"Brisbane."

(EXHIBIT No. 3).

[COPY].

"BRISBANE, *4th August*, 1896.

"DEAR SIR WILLIAM,

"Your letter of 1st July only just received. My memory fails me about Captain Dubbins, but how Bevan can claim to be the discoverer of the Purari River I cannot see, as when I took him across, we steered across direct to the mouth of the river, as laid down on the chart, compiled, as I always heard, from data supplied by Chalmers.

"I have just been reading, with much interest, your account of meeting with Tugeri people, and wish I had been with you at the time; their inroad should be effectually stopped for many years to come at any rate. With compliments,

"I am,

"Yours faithfully,

(Sgd.) "HUGH MILMAN."

(EXHIBIT No. 4).

[COPY].

"PORT MORESBY, *6th August*, 1898.

Statement made by Arudaina, of Hanuabada (or Poriporina) village. And on being duly affirmed, states :—

"The year before the British flag was hoisted at the Mission House by Commodore Erskine, the Rev. J. Chambers accompanied us on a trading expedition for sago, on board of the *Lokatoi*, owned by Aku ; our first stopping-place after leaving Port Moresby was at Gebada, where we sleep for the night. The next day we went on as far as Yokeu and sleep ; the next half day and night we were at sea, and sailed west as far as Vailala. Mr. Chambers went on shore and sleep in the dubu, I remained on board of the *Lokatoi* ; we remained two days. We then crossed the river by a small canoe, Mr. Chambers (Aruaku), Johnny, and myself, walked to Olokolo, where we sleep for the night in the dubu. The next day we started for Maipua, accompanied by a native of that place, by the name of Kunumo. We called from Auvwe to Areri for a canoe, which took us on board and on to Aivi. We meet the Chief, Ipai Vai Kane, of Maipua, at Apepi ; he came on board, when we started again for Maipua, where we sleep for the night. The next day we left in Ipai Vai Kane large canoe, and paddled up the Panaroa, taken soundings ; we went up a few miles and returned to Maipua and sleep for the night. The next day we returned to Olokolo and sleep, the next day we returned to the *Lokatoi*. Mr. Chambers remained with us and saw a few canoes built, when Charles Kidd came in to Vailala with a boat, which Mr. Chambers returned in.

"ARUDAINA (his X mark),

"Taken before me, this sixth day of August, 1898,

(Sgd.) "A. C. ENGLISH,

"Justice of the Peace."

(EXHIBIT No. 5).

[COPY].

"PORT MORESBY, *August 5th*, 1898.

Statement made by Vaburi, a native of Hanuabada (or Poriporina), who being duly affirmed, states that :—

"I visited the following villages on the Arere River, in company with Mr. Chalmers, Aruaku, and my son Aruadaira :—No. 1, Maipua; No. 2, Iari; No. 3, Kairu; No. 4, Kopunairu; No. 5, Okeravi; No. 6, Kaipuravi; No. 7, Waimoaru; No. 8, Era; No. 9, Keme; No. 10, Kerevu.

"Maipua village has eight long houses or dubus, and the name of the Chief is Ipai. The Chief, Mama, went with us as far as Iari, then returned. The above villages were visited by us before Mr. Bevan came to New Guinea.

"Made this fifth day of August, 1898, before the undersigned, one of Her Majesty's Justices of the Peace.

"WABURI (his X mark,),

(Sgd.) "A. C. ENGLISH, J.P."

(EXHIBIT No. 6).

"In einer kurzen Flugschrift wendet sich *Th. F. Bevan*, der bekannte Erforscher zahlreicher Flufsläufe des Papua-Golfes, gegen den Administrator Dr. Wm. McGregor, weil derselbe den Missionar J. Chalmers als Entdecker des Purari, welchem Bevan den Namen Queen's Jubilee River gab, bezeichnet hatte. Bevan gibt jedoch selbst zu, dafs Chalmers vor ihm die zahlreichen Mündungsarme in der Gegend von Bald Head erreicht habe, die er jedoch nicht als einem selbständigen Flufssystem entstammend, sondern als dem Fly-Delta zugehörig ansah. Es unterliegt damit keinem Zweifel, dafs Chalmers der wirkliche Entdecker dieser Mündungsarme des Purari gewesen ist, während Bevan zuerst durch die Befahrung derselben den Nachweis lieferte, dafs sie nicht dem Fly River angehörten, sondern, von einem selbständigen Flusse gebildet wurden."

THE OUTRIDGE PRINTING COY., LTD., QUEEN STREET, BRISBANE.

PROCEEDINGS AND TRANSACTIONS

OF THE

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OF

AUSTRALASIA,

QUEENSLAND.

14th SESSION,

1898-99.

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BY
J. P. THOMSON, Hon.F.R.S.G.S., Hon. Secretary,
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QUEENSLAND.

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(ELECTED AUGUST 5, 1899).

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SUGGESTION.

Every person desirous of bequeathing to the Society any money is requested to make use of the following

FORM OF BEQUEST.

I give and bequeath to the Honorary Treasurer for the time being, of the ROYAL GEOGRAPHICAL SOCIETY OF AUSTRALASIA, QUEENSLAND, *the sum of* ....

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for the benefit of the said Royal Geographical Society of Australasia, Queensland, to be expended as the Council of the said Society may deem expedient for the promotion of Geographical Science or the purpose of exploration in Australasia.

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N.B.—All Donations presented to the Royal Geographical Society of Australasia, Queensland, are acknowledged by letter and in the printed "Proceedings and Transactions."

TRANSACTIONS

OF THE

Royal Geographical Society of Australasia,

BRISBANE.

The Geographical Conditions of City Life.

By J. P. Thomson, Hon. F.R.S.G.S.;

Corresponding Member of the New York Academy of Sciences, &c.

[Read at a Meeting of the Society May 30, 1899.]

Few subjects are of greater interest, none certainly more important, to the great mass of those who live in thickly-populated centres, than the geographical conditions of environment. Taken in its broadest sense the theme is one concerning the welfare of every citizen, and it is from this standpoint that the subject is now occupying attention.

It is evident that the rapid development of cities in many parts of the world is one of the most noticeable features of the progressive age in which we live.

In every civilised country, even amongst the primitive races, the rapidity of the mass-current towards populated centres has, for a long time, been phenomenally and even dangerously great. Within the last thirty years, for instance, the growth of urban population in several countries has been truly wonderful. This has certainly been the case in Australia, the United States of America, Canada, and South Africa, in all of which countries the grouping and packing together of the human race within town limits have been unequalled elsewhere.

In 1850, the city dwellers of the United States numbered 12·5 in each 100 of the whole population of the entire Union. In 1880, the proportion had advanced to 22·5 being an increase of 80 per cent., whilst in our own country, the swelling of the urban

masses, during a corresponding number of years, has been over 10 per cent. greater. This increase, rapid indeed though it be, is insignificant compared with what we shall have to reckon at the end of, say, the next fifty years, assuming, as we are justified in doing, that the population of our Australian cities continues to grow as rapidly in the future as in the past. The reasons for this townward influx are various. Our thickly-populated areas are chiefly commercial and industrial centres, being chiefly trade emporiums, where the far-reaching railway systems, combined with maritime enterprise, have contributed mostly to the establishment of extensive national industries of great activity. Here the working classes, swelled largely by the flood of immigration, have congregated in large numbers, whilst rural communities have also contributed to this influx, the superior convenience and the attractive influence of urban life being the chief factors of influence in this movement. Thus have large and important cities been rapidly evolved at the expense of the country.

This extraordinary development in the growth of our towns is not likely to be seriously or permanently checked for a very long time to come. In the case of our own City of Brisbane, it would indeed be undesirable, even if probable, that its present rate of development should be retarded in any way. But this is not likely to occur, for our capital city is gaining rapidly upon the older centres of the Southern Colonies, and this onward march is likely to be kept up for all time. The more serious aspect of the position is, however, in the form this kind of enlargement usually assumes. It is well known that town areas do not expand in the same proportion as the increase of population. Cities grow very rapidly in height, so to speak, they soon become densely packed by the masses, but the municipal boundaries are persistently slow in expanding. It is in consequence of these existing conditions that we are brought face to face with some interesting social problems—problems which are yearly gaining in importance everywhere, but in no place more so than in our tropical and extra-tropical cities of Australia.

Since so much depends on the influence which town life exercises on the minds and characters of men as well as upon the physical

condition of all classes of a community, it is well to inquire: (*a*) Are sufficient breathing spaces provided for these rapidly increasing urban masses? (*b*) Have convenient and attractive health resorts been provided for necessary outdoor recreation? (*c*) Are our promenades in keeping with climatic conditions and sufficiently extensive to meet the increasing requirements of city life?

Now, these are practical questions, not merely the interrogatives of the pessimist, nor the ideas of a disordered imagination; on the contrary, they are of paramount importance, demanding the earnest and serious attention of all good citizens as well as the consideration of social reformers and philanthropists. They are problems which concern the present as well as the coming generations, and for this reason their solution claims the best consideration of all classes—not merely that form of indifferent or passive attention we are too apt to bestow on matters of vital importance, but the kind of attention made evident by practical demonstration: that happy sort by which the British Empire has been built up and extended from the Equator to the Poles.

The proper use of boulevards, broad avenues, parks and squares is for the necessary ventilation of cities; they are air-holes through which the urban masses breathe, and proper attention to their sanitary condition and efficiency is essential to health. Along and within these ventilators air currents are generated, which also circulate through neighbouring thoroughfares, reducing the temperature and sweeping unwholesome effluvia from under the nostrils of citizens. A glimpse at the sanitary history of such cities as London, Edinburgh, Glasgow, Frankfort, and Paris ought to be sufficient to convince even the most sceptical of the utility of open spaces wherever the masses are crowded together. The good services rendered by a properly regulated system of town air-holes have been very fully demonstrated by the remarkable improvement in the health of the people of the cities to which I have just alluded. Here the slums have been cut through and displaced altogether by fine buildings, the narrow streets have been widened and fine squares have been opened up in crowded districts.

The importance of proper attention to public health in this

respect has received practical recognition at the hands of the State Legislature of New York. This body has "recently authorised the appropriation of a million dollars annually for a term of years for the purpose of eradicating some of the worst slums of the city, and substituting small squares in their places."

The expenditure of even small sums of public money in providing pure air for the masses may appear extravagant or altogether unnecessary to the near-sighted ratepayer, but disease is fell, and nothing costs like it. It is shocking to think of the wholesale extermination of juvenile life that takes place in some of the large cities yearly. The greatest mortality occurs during hot weather, when children succumb to the effects of an insufficient supply of pure, fresh air. This was unhappily but too clearly exemplified in 1887, when the number of children, under five years of age, who died in the city of New York, was sixteen thousand; in one week alone there being no fewer than one thousand deaths recorded through the impurity of the air they were forced to breathe. This is a severe and painful warning of the danger of neglecting to attend to the hygienics of urban life. But, in the face of the bad effects arising from insufficiently ventilated areas, where the masses are densely packed together, the rural dwellers continue to contribute to this acutely congested city life notwithstanding the injurious influence of such contributions, to the race as well as to individual contributors. Fresh air and cheerful surroundings are beneficial to the weak and invalided, they stimulate and no doubt actually prolong life and restore to health. To the middle class and the poor, the facilities afforded for recreation and enjoyment of outdoor exercise, by attractive promenades, are of incalculable value. They raise the moral and intellectual tone and promote physical vigour and development.

Cheerful and healthful promenades are indispensable either in large cities or in country towns, and especially so in tropical and extra-tropical countries.

Mental workers are obliged to recuperate waning energies by recreation and physical exercise, and no one can neglect to do so without impairing the mental power. In point of fact it is well known that the health of the mind sympathises with and to

a very great extent depends just as much upon physical vigour as a machine does upon the motive power by which it is kept in motion. To escape from the confinement of indoor duty performed within narrowly circumscribed space, too often permeated with vitiated air, to verdure-clad walks and surroundings of sunlight, restores hope and health to thousands.

In every civilised part of the world, but more especially in enervating regions, recreation is essential to health. It is in the city, where the pressure of business life is most severe, that the condition of the toiler requires improving and fostering. In writing on this subject, Professor Jevons unhesitatingly declared that "among the means to a higher civilisation the deliberate cultivation of public amusement is a principal one." In the opinion of this eminent authority, open spaces should furnish facilities for popular recreation, and as a part of their equipment, parks should possess concert halls.

In France, Germany, and Denmark, every town is provided with a concert garden, where sweet strains of music, well conducted pantomimes, and brilliant displays of fireworks enliven summer evenings of social recreation. Here, in the midst of these congenial surroundings, the high pressure of busy life is temporarily forgotten, and social intercourse is at the same time happily promoted. There people derive more enjoyment from life than the average working Britishers, although the wages earned by the one are about a third less than the earnings of the others. There is this difference, however, that the foreigners are more thoroughly masters of the art of civilisation than the Britishers, the Americans, or the Australians.

Places of recreation should be conveniently located and easy of access, so that city toilers may not have to walk long distances over cheerless paths to reach them. This is too often overlooked or wilfully disregarded in laying out and building cities where land is even plentiful. In our own City of Brisbane, open air garden concerts ought to be given about three times weekly, and these should be either wholly free to the public or the rate of admission merely nominal. Such concerts would be the means of drawing our town workers from public saloons and undesirable associations, and thereby render them all the better able to fulfil

the duty of citizenship and the geographical conditions of city life.

Whatever may be said to the contrary, there can be no reasonable doubt that physical and mental degeneration is promoted by the influence of urban life. This view is universally supported by the highest authorities on sanitary science, who say that there is practically no third generation in the average tenement of large cities.

Promenades and broad avenues are essentially components of a well conceived park system. Both in large and small cities they should if possible form chains of communication between open spaces within the city boundary and the outside parks. In the case of our Australian towns, these promenades should be planted with umbrageous trees, and provided with rustic seats at convenient intervals.

The necessity for park areas has to some extent been recognised in Brisbane, but the need for open spaces in the heart of the town and the importance of promenades have been overlooked. In no place within the city is there an exclusively pedestrian walk, the public streets being the only conveniently accessible paths which all classes of the community may freely use after the worry and cares of daily labour. The only convenient place for recreation is the public garden and Queen's Park combined, and this enclosure is shut up after sundown, and consequently of no use to the weary toilers for recreative purposes. For this reason alone we find that our citizens, tired and fagged out by long hours of hard work and an enervating summer climate, are obliged to submit to the discomforts and monotony of weary indoor or street life, often surrounded by associations that are neither morally wholesome nor intellectually brilliant There is, however, no other alternative, as things are at present arranged, but to submit to the inevitable and "grin and bear it."

It is more than likely that any practical scheme for recreative improvement within the City of Brisbane would not be entertained, on the score of expense. Much can, however, be done with existing means, without the expenditure of any great amount of public money.

The Botanic Garden and Queen's Park should be thrown open to the public every evening for recreation, the whole river front-

age of both of them, and the Domain as well, being set apart exclusively for a promenade. Such an arrangement would greatly increase the public utility of these places, and at the same time contribute in no slight measure to the health and comfort of the citizens.

"The time will come," said Dr. Gould, "when people will more generally understand that the best way to keep the toilers of our cities from saloons and abodes of vice is to give them better and more wholesome recreation, and then public opinion will justify liberal expenditure in this direction."*

It is a common complaint in Brisbane that there is no exclusively pedestrian walk in the city for evening exercise, and most visitors from outside the colony are surprised to find that the public streets are the only convenient and available pathways for evening recreation. This want encourages immorality to a far greater extent than is generally supposed, or some folks care to admit, for young people are obliged to seek recreation outside the city boundary, where there is greater freedom of action, and consequently less restraint.

In Minneapolis some ten and a half miles of boulevards are provided for public use, and these are ornamented, properly appointed, and kept in good order.

A promenade of nearly five miles in length, called the Alameda or Cañada, runs through the city of Santiago: it is adorned by rows of poplars, by several varieties of acacias, and other beautiful trees that flower in summer, and impregnate the air with delicious perfumes. This Alameda, which is watered and swept daily, is further ornamented by statues of patriots and by attractive gardens. It is used in the late afternoons by the elite of the place and in the evenings by the busy citizens.

Most of the modern towns in other parts of the world also afford ample facilities for public recreation, and in our own Australian cities of Sydney, Melbourne, and Adelaide, tastefully ornamented promenades have been laid out in the most conveniently situated places.

In speaking of some of the general advantages of promenades and open spaces, Lord Hobhouse said:—"They are the constant

* Publications of the American Statistical Association, 1888, p. 53.

source of health and innocent enjoyment to all within their reach." "It is difficult to conceive any lapse of time or change of circumstances which shall take away their value." "They are available, if properly placed, to the poorest classes." "They are a kind of charity which cannot demoralise and cannot be abused or jobbed."

Why, even in the capital of the convict island of New Caledonia there is a large public square in the very heart of the town, and this well appointed resort is always open and well patronised by the community. Promenades have also been laid out in conveniently situated localities, and these are largely used by everybody.

Besides the available areas in our own City of Brisbane, to which I have already alluded, there are several low-lying spaces along the river banks that would answer very well for promenades and recreation reserves. Especially so on the south side of Victoria Bridge between Montague Road and the right bank of the river, where the flood waters have so frequently encroached during recent years, rendering this particular part of the city almost uninhabitable. This and other similarly affected land within the city should be set apart for public purposes, and the owners offered a reasonable compensation in suitable building sites elsewhere, or failing the acceptance of such an arrangement, fair flood prices might be paid for the resumed areas. In any case, such areas should be assessed at low values. This would also have the desired effect of improving the geographical conditions of our city life and minimising the danger and inconvenience of river floods.

To this subject I have given a good deal of attention, and have dealt with it as much from a professional as from a geographical standpoint.

For much information on the subject of this paper I am indebted to Dr. Gould's most excellent and very exhaustive memoir on "Park Areas and Open Spaces in American and European Cities," published by the American Statistical Association, 1888.

Rock Carvings of the Australian Aborigines.

By R. H. Mathews, Licensed Surveyor;

Honorary Corresponding Member.

[With a Plate.]

[Read at a Meeting of the Society, May 30, 1899.]

In former communications to this Society I have drawn attention to some remarkable drawings, carved by the aborigines on the exposed surfaces of sandstone outcrops. Considering the primitive tools used by the natives, the production of these carvings must have been the result of immense labour, especially in regard to the larger figures, some of which are upwards of 60ft. in length. The aboriginal artists had no idea of perspective, and none of their figures are copied from nature, but exhibit a conventional style of drawing, which has probably been handed down from the time of their ancestors. It is with a view of collecting data, from which some conclusions may be obtained respecting the origin and meaning of these and similar carvings, that I have prepared the annexed plate and descriptive letter-press. I hope that some of the readers of this journal will endeavour to discover rock carvings in any parts of Queensland where there may be suitable rocks for the purpose.

Nos. 3 to 7, and 8 to 10, represent groups in their correct relative positions on the rocks ; the remainder of the drawings are fitted on the sheet in such a manner as not to occupy any more space than is necessary. All the carvings herein dealt with are in New South Wales ; and unless otherwise stated are in the county of Cumberland.

No. 1 is a remarkable drawing of a fish whose entire length from the nose to the farthest part of the tail is 21ft. 1in. The mouth is open, with four ciliary lines 7in. long rising from the upper lip. There are three short fins along the belly, and the tail has three divisions, which is rather unusual. The narrow dorsal appendage is peculiar, being 9ft. 10in. long, surmounting a short fin which rises only 19in. from the back of the fish. This carving

is situated near the southern boundary of Portion No. 1499, in the parish of Manly Cove, on an extensive denuded surface of Hawkesbury sandstone, sloping slightly towards the south.

No. 2 represents a woman 3ft. 7in. high, being one of a numerous batch of drawings carved on a large rock within Portion No. 1139, in the parish of Manly Cove. This figure was originally reported by me to the Royal Society of Victoria,* and is now reproduced on account of its unusual interest.

Nos. 3 to 7 are carved on a large rounded mass of Hawkesbury sandstone abutting on the eastern side of the main road from Dural to Wiseman's Ferry, and are distant 42 chains in a northerly direction from the north-west corner of Portion No. 43, in the parish of Frederick. No. 3 is apparently the profile of a human being in a sitting posture, and measures 5ft. 4in. from the top of the head to the posterior. No. 4 is a boomerang apparently held in the hand of the last figure. No. 5 is a fish 2ft. 10in. long, near to which is another boomerang, No. 6. The male figure, No. 7, has his arms extended upwards. On the same large rock are several other human figures, which I contributed to the Anthropological Institute of Great Britain.†

Nos. 8, 9, and 10 represent a group of three human figures, carved on the same flat rock as No. 1, and not far from it. Nos. 8 and 9 are two drawings of men, the former being 5ft. 7in. and the latter 5ft. 9in. high. Between them is a woman, No. 10, 4ft. 11in. in height.

No. 11 is a remarkable fish, carved on a northerly continuation of the same mass of rock as that containing the last group, from which it is distant three or four chains. From the snout to the farthest point of the tail measures 18ft. Within the outline of the posterior portion of the fish is the figure of a man 5ft. 8in. high, No. 12; and attached to one of the long ventral fins is a shield, No. 13, with a longitudinal and a transverse bar. In a former paper‡ I described an emu with a shield drawn upon its body; and in another instance a kangaroo with a shield was

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* Proc. Roy. Soc. Victoria, vii, N.S., 153-154, Plate ix, Fig. 11.

† Journ. Anthrop. Inst., xxvii, 541, Plate xxx, Figs. 24 to 28.

‡ Proc. Roy. Geog. Soc. Aust. (Q.), x, 66-67, Plate 3, Fig. 3.

represented.§ Perhaps in such cases the animal is intended to portray the totemic ancestor of the artist.

No. 14 is another strange drawing of a fish, 9ft. 10in. in length, carved on the same rock as No. 1, which it resembles in some respects.

No. 15 is cut upon the same rock as No. 2, and represents a woman 5ft. 1in. high. The three figures of females, delineated in the annexed plate, are highly interesting, owing to the omission of the mammæ. The latter are frequently represented in a pendulous form on either side of the chest in aboriginal drawings of women.

Nos. 16, 17, and 18 are carved upon a sandstone surface on the ridge at the head of Berry's Bay, one of the inlets of Port Jackson, in the parish of Willoughby. The large fish, No. 16, measures nearly 22ft. in length, and within the tail portion is a human figure, No. 17, with a peculiarly formed head. There is another male figure, No. 18, also within the outline of the fish, but the grooves are so nearly obliterated by the wasting of the rock as to be almost indistinguishable. A few yards from No. 16 are some other small carvings, including human figures, fish, and other objects, which are not shown in the present plate. Nos. 16 and 17 were described by me in an article published by the Anthropological Institute of Great Britain,|| and are now reproduced for the purpose of showing No. 18, which was inadvertently omitted on that occasion. The name of the parish was also erroneously stated to be Alexandria, instead of Willoughby.

Nos. 19 to 22 are carved on an extensive surface of sandstone almost level with the ground, over which passes a bridle-track from Mangrove Creek to the Hawkesbury River, in the parish of Spencer, county of Northumberland. What these objects are intended to represent it is difficult to determine. The three rabbit-like animals may portray the native bear, or perhaps they were intended to represent some insect. No. 19 looks like a bee or fly.

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§ Journ. Anthrop. Inst., xxv, 161, Plate 16, Fig. 3.

|| Journn. Anthrop. Inst., xxvii, 538, Plate 30, Figs. 11 and 12.

CORRECTION.—Vol. X., page 69, line 13, for "a chain and three-quarters westerly" *read* "about thirty chains in a south-easterly direction."

Some Critical Notes on the Queensland Volume of the International Catalogue of Scientific Literature.

[Read at a Meeting of the Society, June 30, 1899.]

"International Catalogue of Scientific Literature, Queensland Volume," is the title of a small brochure of 154 pages of letter-press, by John Shirley, B.Sc. (Lond.), District Inspector of Schools. There are nine additional pages devoted to the author's preface, to a table of contents, a list of errata, and a table of abbreviations, the whole being well printed in clear readable type, on nice paper, Brisbane, 1899. The copy now under review was received from the Council of the Royal Society of Queensland as a donation to the library of our Royal Geographical Society of Australasia here.

As the compiler of this catalogue states in his preface that most of the information has been derived from the publications of the local scientific bodies, including our own Society's "Proceedings and Transactions," it is felt necessary to make some critical observations on the nature of this information, and the general character of the catalogue itself. This, it must be confessed, is by no means a pleasant task, but on behalf of one of the Societies named by Mr. Shirley, on whose publications among others it is acknowledged the catalogue is based, the Council of the Royal Geographical Society of Australasia, Queensland, has, in self defence, authorised the preparation of these notes for general information. It would, indeed, have been more agreeable and pleasant to have written in praise of Mr. Shirley's work, had it really been what its title represents it to be. But this is far from being the case, and to remain silent and permit this volume to go out to the world as a true and faithful record of the scientific literature of Queensland, without challenge, would be against the best interests of our local scientific societies and students of human knowledge. Such a course would indeed only be discreditable to all concerned and highly prejudicial to the scientific literature of the colony. It must be clearly under-

stood, then, that this is an enforced duty undertaken generally in the interest of correct historical information, but more particularly in vindication of the reputation of this Society, and at the same time with the view of doing some slight justice to local workers, who are the authors of meritorious contributions to our store of human knowledge, ruled out of the catalogue. That this task shall be fulfilled without fear or favour, is certainly the intention of the Council.

"This Society" (the Royal Society of Queensland), says Mr. Shirley, in his preface, "appointed a committee of two to carry out the work; but one of these, under pressure of business, was obliged to withdraw, and I had to collect, arrange and classify the material without a colleague." This not altogether unambitious statement is, however, scarcely consistent with a subsequent remark, in which our bibliographer acknowledges the services of three well-known authorities, who revised, arranged and classified the chemistry section, the vertebrates and the Lepidoptera. It can scarcely be otherwise than a source of very general regret to all students of scientific literature that more sections of the catalogue were not submitted to other equally competent and representative authorities for similar treatment, before publication. Had this been done the number of omissions, which occur with surprising and distressing frequency, and errors as well, would have, no doubt, been greatly reduced, or probably avoided altogether, and instead of the present incomplete and one-sided compilation we should have had a more adequate and creditable one—a volume in some slight measure worthy of our local institutions and this colony. As it is, the work is a most presumptuous compilation altogether. The first page of the preface discloses an error, and the second entry on the first page of the catalogues of authors reveals a stupid omission of the title of a work. Standing by themselves, these are no doubt trivial slips, but their occurrence in the opening pages of such a publication—essentially a work of reference—is sufficiently suggestive of doubt as to the reliability of the general contents of the volume, and its ready acceptance by students of scientific literature, with confidence. However, these trifling lapses might readily have occurred under the most experienced

eye, and were they the only blemishes in the publication there would be no need at all for these remarks. That this unhappily is not the case, remains to be seen.

The volume appears to be a most one-sided production, compiled by a hand unaccustomed to the work. As a matter of fact the efficient preparation of such a catalogue could only have been satisfactorily carried out by several practised representative collaborators, whose combined experience and good common sense would have happily united to produce the very best results. Judgment and experience are most needed in analysing material for works of the kind now under treatment, and a harmonious combination of both would in the present case have been more satisfactory to all concerned.

Taking the catalogue by itself, there is really nothing to show what are Mr. John Shirley's qualifications for undertaking the compilation of a professedly international publication. The preface of the work is in itself inadequate, there being much of the compiler's own views of the subject, and far too little concerning the plan adopted for cataloguing scientific literature. Instead of his own way of putting this, it would have been far better for Mr. Shirley to have followed Professor Liversidge's excellent example and have published all, or nearly all, of the resolutions adopted by the International Scientific Catalogue Conference, for general information.

"Nearly all the resolutions," said Professor Liversidge, in his Presidential Address to the Australasian Association, "are given (see page 51) because they should be known by our members, in order that we may be in a position to consider the matter, with the view, if possible, of co-operating in so very important an undertaking. Every person in Australasia and elsewhere who is the author of a published paper upon any branch of pure science should take an interest in this matter, because he will in future probably be required to prepare an index of the contents of his paper for publication by this Committee."*

Out of all the resolutions to which Professor Liversidge has alluded, only two have been published in full in the Queensland volume, by Mr. Shirley, and these, strange to say, have really

* Aust. Assoc. Adv. Sci., Vol. VII., pp. 16 and 17.

no material bearing on the character of the catalogue. Three of the most important ones of all have not been given. They are as follows:—

> "That the Catalogue shall comprise all published original contributions to the branches of science hereafter mentioned, whether appearing in periodicals, or in publications of Societies, or as independent pamphlets, memoirs, or books."
>
> "That in judging whether a publication is to be considered as a contribution to science suitable for entry in the catalogue, regard shall be had to its contents, irrespective of the channel through which it is published."
>
> "That a contribution to science for the purpose of the catalogue be considered to mean a contribution to the Mathematical, Physical or Natural Sciences, such as, for example, Mathematics, Astronomy, Physics, Chemistry, Mineralogy, Geology, Botany, Mathematical and Physical Geography, Zoology, Anatomy, Physiology, general and experimental Pathology, experimental Psychology and Anthropology, to the exclusion of what are sometimes called the applied sciences—the limits of the several sciences to be determined hereafter."

Now these resolutions are clear enough, and no one could reasonably take exception to a catalogue compiled in accordance therewith. This, however, has not been done in the present instance, as we shall now proceed to show. "The Eighteenth Resolution of the International Catalogue Conference," says Mr. Shirley "limits the contents of the catalogue to 'original contributions to the branches of science,' it has, therefore, been necessary to rule out all productions that do not contain original or research work." Now, as a matter of fact, there is not a word about "research work" in this resolution at all, the words being simply unnecessarily used by Mr. Shirley for reasons best known to himself, as they do not seem to add point to the compilation in any material way, so far as one is able to judge. But we shall pass that by for the present, being content to see how far the contents of this catalogue are consistent with the statement of its compiler, for this is what chiefly concerns us just now. A very superficial examination of the work, even, cannot fail to convince any person of average intelligence that there is really a great deal of *inconsistency*, which one would hardly expect to find in such a work as the International Catalogue of Scientific Literature. In point of fact, "all productions that do not contain original or research work," *have not been ruled out* by a

long way, for in numerous cases mere compilations have been included, and many more original and highly valuable contributions to scientific literature have been omitted altogether. Let us take, for instance, at mere random, the first division of the catalogue, arranged according to authors. Here in Section F., Chemistry, for example (page 6), is included a paper entitled "Contributions to the Bibliography of Gold." This was contributed to the Brisbane Meeting of the Australasian Association, and is simply a compiled list of the titles of various books and papers on the subject of Gold. It claims to be nothing else whatever.

Passing over many very doubtful entries, the next work of this class occurs in Section J., Geography, page 18: "Narrative of an Exploration of the Coen," and other rivers in North Queensland. This is simply a compilation by the author of the contribution itself from Notes supplied by the leader of the expedition.

"In the Early Days" is the historic title of another compilation appearing on page 20, and on the following folio the "Geographic History of Queensland"—date of publication omitted—is set down as an original contribution, although really not so, and certainly not scientific.

Turning over to page 22 there are two very dissimilar titles of widely different works, one a compilation, called "Statistics of the Colony of Queensland for the Year 1897," The other, an original thing, it is true, is entitled "Life Among the Afghans," but it is there credited to Mr. Shirley, who "communicated" it to the *Queensland Educational Journal*, instead of Dr. Gray, by whom it was contributed to the Australasian Association.* The penultimate entry on the same page of the catalogue comprises the title of a very useful compilation known as "Queensland Past and Present," with which most of us local folk are fairly familiar. From this point there is a gap to page 31, where there occurs the botany section, and in this there is entered, amongst

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* This is quite a novelty in literary authorship. Dr. Gray, the real author of the work, would, no doubt, be as much surprised at this entry in the catalogue as a certain well known Brisbane Surgeon was to find one of his original contributions to medical literature—published in the *Australasian Medical Gazette*—on a very rare skin disease, reappearing in an English publication as the work of another local Medico.

many titles, the "Synopsis of the Flora of Queensland," described in the subject catalogue on page 133 as *A compilation* from the Flora Australiensis and Fragmenta Phytographiæ, giving all known Queensland plants, with descriptions. This is followed on the next page by a couple of entries designated supplements to the Synopsis of the Queensland Flora, with descriptive notes indicating that they are based on Baron F. von Mueller's determinations, and have been taken from the work of that illustrious botanist. Now the question arises, Can these three last entries be regarded as original contributions to scientific literature for the purpose of the catalogue, in face of the descriptive notes to the effect that they are mere compilations? The question is asked, because the compiler of the catalogue has in effect stultified himself by implying that they are not original contributions, and ought, therefore, to have been ruled out altogether. It must be clearly understood that we are not advocating such a course at all, but simply judging by the evidence of the descriptive notes to which we have alluded, in which the writing speaks for itself. But there are other anomalies besides this one, and other strange features in the character of the catalogue that reveal the one-sided nature of the publication; it is to some of these that we now turn. The term "one-sided" has been used advisedly because the onesidedness has not been so effectually concealed as to elude detection and disarm the suspicious eye of a critical observer. One searches in vain for the guiding principle adopted by the compiler of this catalogue in analysing material for its contents, and surely there is room enough for doubt when a number of mere compilations, which should be omitted, are found occupying the place of original meritorious contributions to the scientific literature of the colony, that have been left out altogether—not merely by accident, for the channel through which they were originally published would entirely obviate the probability of any accidental omission.

So far we have only alluded to the titles of self-evident compilations, picked out at haphazard, avoiding any reference to the many doubtful entries that are scattered over the pages of the catalogue, including even the "Review of Recent Botanical Work in Australia," obituary notices, catalogues of minerals and such like works.

It would appear that in some cases favoured authors have supplied full and all embracing lists of their publications, and these seem to have been printed *in extenso*, without any editorial discrimination whatever ; consequently the contrasting position of these ponderous and highly inflated lists in the catalogue invites attention, and points to some strange anomalies that might otherwise have escaped detection. These are very noticeable on the first four pages, where there occur about a dozen entries of mere meteorological maps, whilst similar cartographical contributions crop up on pages 10, 12 and 13, in the shape of geological maps, These, it seems necessary to point out, stand by themselves, and are not associated in the catalogue with any literary work at all, although they are credited to their respective authors as original contributions to scientific literature. Now, this seems to us to be a new development of literary types altogether, and one which will come as a surprise to Geographers and others who have been accustomed to look on maps and charts as things that represent *art* rather than literature. Why did Mr. Shirley not also include the many very excellent maps that have been published by the Surveyor-General of the Colony as well as the ones issued by other Government departments and private sources as well, including early geological maps? And the same may be said of departmental reports. We find, for example, that the annual reports of the Government Geologist have been very carefully included, and so has also one of the Registrar-General's reports, giving the statistics of the colony for the year 1897. Why have the statistics of previous years not been given, and why not also have included other departmental reports, that contain additions to our store of human knowledge?

On the one hand the aim seems to have been to crowd certain sections of the catalogue with every thing available, indiscriminately, and on the other to covertly leave out as much as possible and a great deal more than was permissible. The omissions are, in point of fact, deplorably great, and would in themselves constitute a very deep and enduring blot on the Queensland Catalogue of Scientific Literature, apart from any other blemish. It would indeed be safe to say that not more than a half

of the scientific literature of the colony has been included. Lack of thoroughness is no doubt responsible for some of the omissions, but not for all, by any means. A very fair example of the character of the work in this respect may be seen in the light of the following original meritorious literary contributions, which have been ignored altogether, and these, be it known, are merely jotted down from memory, without any attempt whatever to supply omissions:—

(1) "The Ornithology of Australia: Being Illustrations of 244 Australian Birds, with Descriptive Letterpress. 1875."—A local work of very great merit.

(2) Presidential Address: "On Minute Measurements of Length and Weight." —*Proceedings of the Philosophical Society*, North Queensland. Vol. i. 1899-90, pp, 5-10.

(3) "Analyses of Well Water of Charters Towers."—*Ibid.* p. 21.

(4) "Some of our Queensland Timbers," with 3 plates of water colour drawings of sections for microscopic examination, and tables showing result of experiments to ascertain the transverse strength of some timbers.—*Ibid.* pp. 14-17.

(5) "Journal of an Expedition to the Gulf of Carpentaria and Back, 1865." With map and valuable scientific appendix.

(6) Inaugural Address.—*Proceedings and Transactions of the Royal Geographical Society of Australasia*, Queensland, Vol. i. p. 18.

(7) "The Upper South Johnstone River."—*Ibid.* p. 117.

(8) "Reminiscences of a Surveying Trip from Boulia to the South Australian Border."—*Ibid.* Vol. ii. p. 99.

(9) "The Mountains of Queensland."—*Ibid.* p. 115.

(10) Presidential Address.—*Ibid.* p. 160.

(11) "Some Remarks on the Cardwell District."—*Ibid.* Vol. iii p. 5.

(12) "Geographical Distribution of Plants."—*Ibid.* Vol. iv. p. 26.

(13) "The Torres Groups."—*Ibid.* Vol. v. p. 43.

(14) "Notes on the Brisbane River Floods."—*Ibid.* p. 67.

(15) "Practical Suggestions to Travellers," with Illustrations.—Vol. vii. p. 68

This last contribution was considered by travellers and professional experts in other parts of the world to be of such exceptional merit as to justify its being reprinted *in extenso* in the journals of the Manchester and Tyneside Geographical Societies, and most of it in the organ of the British Institute of Surveyors. Locally, it also met with the very hearty approval of His Excellency Sir Henry Norman and the Hon. A. C. Gregory, in both of whose presence the paper was read and discussed.

(16) Anniversary Address.—*Ibid.* p. 104.

(17) Notes on a paper read.—*Ibid.* Vol. viii. pp. 22-25

(18) "Viti."—*Ibid.* p. 22.

This last contribution embodies the results of its author's own professional experience in the country with which it deals. It was considered by the foremost geographers of Great Britain and Europe to be a very meritorious memoir, worthy of an honoured place in *The Scottish Geographical Magazine*—one of the leading monthlies of its kind; it was selected for special notice in the "Annals of Geography," Paris, and the local Press of the colony dealt with spoke of the work in terms of praise.

(19) "Commercial Geography."—*Ibid.* p. 73.

(20) "On the Construction of the Spirit Level in its Application to Instruments for the Determination of Geographical Positions."—*Ibid.* Vol. x. p. 71.

(21) "The Blossoming of the Eucalyptus and its Influence on the Product of the Honey Bee, from a Commercial Standpoint."—*Ibid.* Vol. xi. p. 39.

(22) "Artesian Water Supply."—*Ibid.* p. 106.

(23) "Geography in Australasia—Anniversary Address."—*Ibid.* p. 138. —

This last one, as a matter of fact, is one of the most original contributions to geographical science published in any of the volumes issued by the Royal Geographical Society of Australasia, in Queensland. It gives the results of what had actually come under its author's own personal observation during an experience of about twenty years in Australasia. Indeed, this very same address, which has been ruled out of Mr. Shirley's catalogue, elicited the following appreciative remarks from His Excellency Lord Lamington, in whose presence it was delivered:—

Never have I listened to an abler and more comprehensive address than that just delivered by our President; I have, indeed, never heard a more careful treatment of the subject of Geography than the one he has just put before us. . . . . . . He has gone into all the ramifications of Geography, into its divisions, subdivisions, branches and sections. Further than that, he has traced the utilitarian effect that it has upon the training of any person, and beyond that he has shown what is the practical utility of all these branches of geography upon the conditions of the human race.

Perhaps in no other respect has the compiler of the catalogue so unwarily displayed such remarkable presumption and covert personal bias as shown by the inclusion of his own contribution on "A Review of Recent Botanical Work in Australia" (given as a Presidential address to the Royal Society of Queensland), and the exclusion of a similar address by the President of a kindred local society on "Geography in Australasia." This in

itself will probably give a pretty fair idea of the onesided character of the so-called Queensland volume of the International Catalogue of Scientific Literature.

However, two more omissions claim attention :—

(24) "Notes on Mining Life and General Features of Pahang, Malay Peninsula."—*Proceedings and Transactions of Royal Geographical Society of Australasia*, Queensland.—Vol. xii. p. 1.

(25) Anniversary Address.—*Ibid.* p. 30.

This is far from being, and is not intended to be, an exhaustive or even a representative list of omissions, but it is really not necessary to go any further at present. About a score of the entries in it represent the titles of some of the very best of the original contributions, published by the Royal Geographical Society of Australasia, Queensland, which have been ruled out of Mr. Shirley's catalogue altogether. The list could have been greatly enlarged by merely including other works published in our volumes, which are certainly no less original in subject and literary composition than most of the entries in the publication under review, apart altogether from those to which we have alluded. In this respect the omissions, in point of fact, include much that was considered by the highest authorities to be most valuable contributions to geographical literature, and the manner in which these have been treated has contributed in no small measure to the unsatisfactory nature of Mr. Shirley's work, rendering his catalogue incomplete and practically valueless as an authoritative record of the scientific literature of the colony. More than this, for an uncanny element of personal feeling and self assertiveness appears to be associated with the work in many respects, although noticeable in some sections of it more than in others. Thus we find, for example, some of Mr. Shirley's own contributions entered, say, on page 24, Palæontology, to reappear again in other sections, for instance, Botany, page 36. In this manner he has associated his own name with a rather wide and comprehensive range of subjects, whilst other contributors have, at the same time, been deprived of similar privilege. Like most of the average pedagogues Mr. Shirley has yet to learn that modern Geography is a far reaching and deep seated department of human knowledge, whose ramifications extend far beyond his limited horizon. He has overlooked the fact

that many contributions to geographical literature—indeed all complete and thorough ones—deal with such subjects as flora, fauna, geological formation, climate, soil, industries, settlement, conditions of life, racial peculiarities, and other divisions more general in character. But even the brief descriptive notes, appended to some of the entries in the second section of the catalogue, show all too plainly the leaning sympathy of the compiler, some of these, especially in the Palæontological and Botanical divisions, being overloaded with details, recounting numerous species, subspecies and types, familiar to the author, whilst in other places these descriptions are often either greatly misleading, or quite inadequate to give a fair idea of the scope and general subject of any contribution listed.

The second part of the catalogue betrays haste and inexperience in bibliographic compilation. Here the entries, supposed to be arranged according to subjects, reappear in the order of authors, up to page 76, where the proper arrangement only begins and is carried on to the end of page 132; thence to the end of the volume the disarrangement is adhered to. The effect of this disorder in a literary work of the kind is just as confusing as it is amusing.

We have already alluded to some of the resolutions adopted by the London Catalogue Conference and their effect on the International Catalogue of Scientific Literature. Now, in the light of these it seems to us that all original contributions to the scientific literature of this colony should have been entered in the Queensland volume, irrespective of the channels through which they are published. But this has not been done, periodical literature, with one or two exceptions, having been ignored altogether, and consequently the so-called catalogue is, in this sense as well as in respect of the numerous omissions and inadequate representation, most incomplete and misleading. Many valuable and original literary contributions to science have been published from time to time in most of our local periodicals, such as the *Queenslander*, the *Week*, and other prints of good repute and long standing. According to the resolutions of the conference these should have been listed, and the history of our scientific literary work brought up to date in a thorough, com-

plete, and reliable manner, in the interests of the colony and to the credit of contributors. But, as the catalogue now stands, its title must be changed to read thus:—"A list of *some* of the literary works published in the volumes of the Brisbane Scientific Societies, and in the Annual Reports on British New Guinea. Classified and arranged on a novel plan, and annotated in some very special divisions with detailed descriptive notes, by John Shirley, B.Sc. (Lond.), District Inspector of Schools."

In the first place the catalogue was commenced too soon, and rushed through too quickly to be of any permanent value. "January 1st, 1900," was fixed by the London Conference "as the date of the beginning of the catalogue."

APPENDIX TO THE CRITICAL NOTES.

The following correspondence concerning the criticism of the "Queensland Volume of the International Catalogue of Scientific Literature," has been addressed to the Honourable the Chief Secretary of Queensland:—

[Copy.]

"The Royal Geographical Society of Australasia (Queensland),
Brisbane, 19th July, 1899.

To The Under Secretary, Chief Secretary's Office, Brisbane.

Sir,—On behalf of the Council of this Society, I have the honour of acknowledging the receipt of your letter dated the 13th instant, No. 99-2944, addressed to our President, in which you desire information concerning a paper read at our last Monthly Meeting, entitled "Some Critical Notes on the Queensland Volume of the International Catalogue of Scientific Literature."

In response to your request, I am now directed to forward herewith a copy of the resolutions unanimously passed at a meeting of my Council, held to-day, together with a printed copy of the paper in question, for the information of the Honourable the Chief Secretary.

I may just point out that our copy of the "Queensland Volume of the International Catalogue of Scientific Literature" was received as a donation from the Council of the Royal Society of Queensland, under whose authority it naturally appeared, and must still appear, to have been published, in the light of the circular note that accompanied it.

In any case, my Council is most decidedly and unanimously of opinion that, in its present form, the Catalogue in question will, if sent out to the world, be most injurious to the best interests of this Society, and highly prejudicial to the scientific and literary reputation of the colony."

I have the honour to be, Sir,

Your most obedient servant,

(Sgd.) JAMES IRVING, M.R.C.V.S.L.,

Vice-President, R.G.S.A. (Q.)

[Copy.]

THE ROYAL GEOGRAPHICAL SOCIETY OF AUSTRALASIA (QUEENSLAND).

Council Minute.

RESOLVED :—

(1) That a printed copy of the paper—prepared by a Committee of the Council and of which the Council as a body assumes the responsibility—entitled "Some Critical Notes on the Queensland Volume of the International Catalogue of Scientific Literature," be forwarded for the special information of the Honourable the Chief Secretary of Queensland in response to his request embodied in a letter dated the 13th July, 1899, addressed to the President of this Society.

(2) That the Council, in vindication of the position of The Royal Geographical Society of Australasia, as a scientific and literary body—which has attained a recognised place amongst the leading kindred institutions in Australasia and acquired a world-wide reputation for the value of its work in this Colony during the last fourteen years,—as well as in the best interests of the scientific and literary reputation of the Colony, very respectfully and strongly recommends to the Hon. the Chief Secretary the desirableness of suggesting to the Council of The Royal Society of Queensland (under whose authority the publication in question was issued to this Society) the expediency of placing the "Queensland Volume of the International Catalogue of Scientific Literature" into competent and representative hands for thorough revision and completion before being sent out to the world as a representative compendium of the scientific literature of the Colony.

(3) That to this end the Council will be prepared to render every possible assistance.

Carried unanimously.

(Sgd.) JAMES IRVING, M.R.C.V.S.L.,

Vice-President, R.G.S.A. (Q.)

19th July, 1899.

[Copy.]

"The Royal Geographical Society of Australasia, Queensland,
Brisbane, 29th August, 1899.

The Under Secretary, Chief Secretary's Office, Brisbane.

Sir,—On behalf of the Council of this Society, I have the honour to acknowledge the receipt of your letter of the 18th instant, No. 99,3602, covering a communication from the President of the local Royal Society in reply to our criticism of the "Queensland Volume of the International Catalogue of Scientific Literature." But we note that no sufficient answer has been given to the criticism impugning the accuracy and value of the catalogue. This reply, we find, which is wholly taken up with an effort to unsuccessfully combat some very trivial points quite immaterial to the criticism, not only tacitly admits the incomplete and non-representative character of the said catalogue volume, and consequently sustains our chief contention to that effect, but it also emphasises more clearly than ever the necessity for revising and completing the work in question, so as to render it of greater value as a thing of reference. To this end, as well as in the best interests of the scientific and literary reputation of the colony, my Council again very respectfully urges upon the Hon. the Chief Secretary the advisableness of suggesting to the Royal Society of Queensland the expediency of revising and completing the Queensland volume of the Science Catalogue by the issue of a supplement, in which the numerous works omitted in the first compilation may be included, and such necessary revision effected by competent and representative authorities as will make the whole work acceptable to students of scientific literature and creditable to the country.

We are unanimously of opinion that the difficulty which has occurred in connection with this case would have been wholly avoided had the work (embracing as it does all the departments of science) been carried out by a staff of representative workers, instead of one person only, and, with the view of obviating a recurrence of this difficulty, we very respectfully suggest that in future each local scientific body and authors of published contributions to the scientific literature of the colony, be, according to usual practice in such cases, invited to send in lists of their works for inclusion in the catalogue.

We also note that the President of the local Royal Society addresses himself in "reply to Mr. J. P. Thomson's statements." This is erroneous, and requires correction. The criticism in question is the work of the Council of this Society as a body, and this fact is fully stated in our previous correspondence, as well as in the criticism itself."

I have the honour to be, Sir,
Your most obedient servant,
(Sgd.) HUGH M. NELSON, President.

ANNIVERSARY ADDRESS.*

By The Rt. Hon. Sir H. M. Nelson, P.C., K.C.M.G., D.C.L., etc.,

President of the Royal Geographical Society of Australasia, Queensland.

Your Excellency, Ladies, and Gentlemen,—

My first duty is to thank you very warmly for having elected me to the distinguished position of President of the Royal Geographical Society of Australasia (Queensland), an honour which I value most highly. I am, however, at a loss to know what special qualifications I possess for such a high office, because geography is a science to which I have never had an opportunity to devote much time or attention. But I will endeavour to fill the chair to the best of my ability, seeing that it is your unanimous wish that I should occupy it. I think I ought to take advantage of this occasion to congratulate the Society on its improved circumstances, and on its being in possession of such commodious premises. I consider that the Government has well and wisely shown their recognition of the usefulness of the Society by promising to submit for the approval of Parliament a proposal to grant an annual subsidy of £50 to cover rent and other expenses, and also an endowment of pound for pound on all subscriptions which might be received. I have no doubt that Parliament will duly recognise the usefulness of the Society's work, and that the proposal will be heartily approved of. As I have already stated, I am not very well qualified to address you technically upon subjects connected with the Society, and therefore you will not expect anything original on my part. I have, however, culled a few notes from various sources, which I think may be of interest to you. and in which I express more the opinions of others who are experts and scientists than my own.

ANTARCTICA.

It is gratifying to have the assurance that Great Britain is prepared to maintain her accustomed place in the foremost ranks

*[Delivered at the Anniversary Meeting of the Royal Geographical Society of Australasia, Queensland, August 5th, 1899.]

of exploring enterprise. For this, I think, not only geographers, but all other scientists are indebted to the assiduous and unremitting efforts made by the President of the Royal Geographical Society—Sir Clements R. Markham—and Sir John Murray, of "Challenger" fame, both of whom have for some years back, "in season and out of season," been straining every nerve in order to accomplish the proper equipment of an expedition to the Antarctic regions. Until quite recently nothing of any importance has been done in this direction since the famous expedition of Sir James Clark Ross, between the years 1839 and 1843. Whalers and others, actuated by commercial enterprise, have made an occasional dash into the Antarctic Sea with various results; but what is now required, in the interests of science in particular, is a "steady, continuous, laborious, and systematic exploration of the whole of the Southern regions, with all the appliances of the modern investigator." The first navigator who ventured into those appalling but magnificent realms of ice was our celebrated Captain Cook, who in his second expedition in the year 1772 (the same year in which the French navigator Kerguelen discovered land to the S.E. of the Cape of Good Hope, and somewhat prematurely reported that he had discovered a great Southern continent), had, as the one express purpose of his expedition, the settling of the question respecting the existence of any such Southern continent. Cook crossed the whole Southern Ocean, and so far settled the matter as to make out with certainty that if such a continent did exist, it must be within the Antarctic Circle, and covered with perpetual snow and ice. He reached latitude 71deg. 10min. South in longitude 106deg. 54min. West, and came away with the belief that there *was* a tract of land towards the South Pole. "It is true, however," he says, "that the greatest part of this Southern continent (supposing there is one) must lie within the Polar Circle, where the sea is so pestered with ice that the land is thereby inaccessible. The risque one runs in exploring a coast in these unknown and icy seas is so very great that I can be bold enough to say that no man will ever venture farther than I have done, and that the lands which may lie to the South will never be explored. Thick fogs, snow-storms, intense cold, and every other thing that can

render navigation dangerous, must be encountered, and these difficulties are greatly heightened by the inexpressibly horrid aspect of the country, a country doomed by nature never once to feel the warmth of the sun's rays, but to lie buried in everlasting snow and ice. The ports which may be on the coast are, in a manner, wholly filled up with frozen snow of vast thickness; but if any should be so far open as to invite a ship into it, she would run a risque of being fixed there for ever, or of coming out in an ice island. The islands and floats on the coast, the great falls from the ice cliffs in the port, or a heavy snow-storm attended with a sharp frost, would be equally fatal." The question whether such a continent does or does not exist, is one of the points not yet determined, for although we know that lands have been discovered and named, it has not been determined whether they form part of a continent or are merely islands in the Antarctic Sea. Sir John Murray is of opinion that there is sufficient evidence of the existence in that region of a vast extent of true continental land, of an area greater than that of Australia, say about 4,000,000 square miles.

Weddell, in 1823, ventured further than Cook; he reached 74deg. South, but saw no land. Then Sir James Clark Ross, in 1841-42, reached the 78th parallel, and discovered Victoria Land. It is to these enthusiastic explorers that we owe nearly all the trustworthy information we at present possess respecting these ice-bound regions. Ross, like Cook, was noted for the accuracy of his observations, the chief object of his expedition being to study the magnetic conditions of the southern Antarctic latitudes. Victoria Land, which he discovered, consists of mountain ranges from 7000 to 12,000 and 15,000 feet in height, and he was unable to effect a landing, except on two islands, named "Possession Island" and "Franklin Island." He traced the coast for about 500 miles southerly to the volcanic cones of Mount Erebus and Mount Terror, the former of which at the time of his visit was vomiting forth flame and lava from an elevation of 12,000 feet. He further traced the ice barrier in a westerly and easterly direction for about 300 miles, and from an account of his voyages we get some idea of the anxieties, dangers, and sufferings, as well as the charms and fascination, connected with such exploratory work.

I have mentioned that the chief object of his exploration was to make magnetic observations, and this work he carried out with marked success, so far as the appliances of science were then available; but our want of observations since his time in the far South has almost brought the progress of the science of terrestrial magnetism to a standstill. Yet the extension of science in this direction is of the gravest importance to the whole mercantile world, seeing that international intercourse is so largely dependent upon navigation. If the matter was so important in 1839, when Ross was first despatched, and when all the ships of the world were built of wood, it is a thousand times more important *now*, when iron and steel ships are the rule and wooden ones the exception. One high authority says:—"Each of these modern ships is a magnet, and if we would know the nature of their magnetism, we must first know the nature of their parent magnet, the Earth." "Now, the distribution of the Earth's magnetism is well known to be constantly changing. But if we can once acquire a correct knowledge of the Earth's magnetism for different epochs, scientific men can obtain a series of *constants*, by means of which they may be able to construct, in advance, those charts of the variations of the compass, and of the magnetic dip and force, which are so important to navigation." This indicates one important practical result which may be attained from an Antarctic expedition, seeing that a magnetic survey of the southern area is essentially required for a full knowledge of the subject. Besides, there are many other questions connected with science which the exploration contemplated may tend to solve.

Meteorology, for instance, expects to derive great assistance from a systematic series of observations within the Antarctic Circle. The low atmospheric pressure which is maintained in all seasons in the southern hemisphere South of 40 deg. latitude, is one of its most remarkable features, and it seems hardly possible to overestimate the value of such observations for a right understanding of the general meteorology of the globe. Professor Thoulet says, with regard to magnetism and meteorology:—"The North Pole is continental, and is, in consequence, the domain of irregularity, and in my opinion its conquest is not worth the efforts which it has already cost. But it is otherwise with the Antarctic regions,

which are oceanic, and therefore, subject to rule. The Arctic phenomena are complications or exceptions; the Antarctic are general phenomena, and their discovery is bound to conduce to the formulation of *natural laws*—the *final aim* of science."

Sir John Murray sums up the purposes of an Antarctic exploration as follows, viz.:—"To determine the nature and extent of the Antarctic continent; to penetrate into the interior; to ascertain the nature and depth of the ice-cap; to observe the character of the underlying rocks and their fossils; to take magnetical and meteorological observations both at sea and on land; to observe the temperature of the ocean at all depths and seasons of the year; to take pendulum observations on land, and possibly also to make gravity observations at great depths in the ocean; to bore through the deposits on the floor of the ocean at certain points, to ascertain the condition of the deeper layers; to sound, trawl, and dredge, and study the character and distribution of marine organisms. All this should be the work of a *modern* Antarctic expedition. For the more definite determination of the distribution of land and water on our planet; for the solution of many problems concerning the Ice Age; for the better determination of the internal constitution and superficial form of the Earth; for a more complete knowledge of the laws which govern the motions of the atmosphere and hydrosphere; for more trustworthy indications as to the origin of terrestrial and marine plants and animals, all these observations are earnestly demanded by the science of our day."

Two recent voyages are worthy of note—namely, the voyage of the "Antarctic," a Swedish trading steamer, which entered the main ice-pack on the 5th January, 1895, and penetrated with little difficulty as far South as 74 deg. Victoria Land was sighted on the 16th of that month at the point named by Sir James Ross—"Cape Adare"—as a compliment to his friend—the late Lord Dunraven. At this point, Captain Kistersen effected a landing, which had never been done before. "It was a very low point," he says, "inhabited by millions of penguins, and it forms a break-water for the deep bay to the West of Cape Adare, named Robertson Bay by Sir James Ross. Specimens of stones, lichens, and sea-weed were collected and brought on board."

This expedition was essentially a commercial venture, but in that respect it resulted in failure. The largest whales seen were those known as "blue whales"—probably the same as those called the "black whale" by Sir James Ross. They were unsuccessful in obtaining any specimens of what is known as the "right whale," the difference in the value of the two being £200 for the former as compared with from £1500 to £2000 for the latter.

At the time that the "Antarctic" visited these places, the bay was clear of ice, but on the return voyage she passed through an immense number of icebergs, and sighted one of the Ballery Isles on the 5th February, arriving at Melbourne on the 11th March, 1895. Captain Kistersen noticed a strong tidal current flowing North along the coast of Victoria Land. At the same time the large jelly-fish, which he had never seen in very cold water, inclined him to the conclusion that there were warm currents from the North. The period for observations was, however, too short to enable him to make any general observations on winds and currents.

Another expedition, fitted out by the Belgians, has just been completed. In response to the efforts of the Royal Belgian Geographical Society, at Brussels, a vessel named the "Belgica" left Punta Arenas on the 14th December, 1897, and after some delays at the Straits of Magellan and Staten Island, she entered the Pacific on the 12th February, 1898. Alexander Land was sighted on the 16th (only four days' sailing), as well as land to the East, which might be Graham Land or Adelaide Island. Continuing to the westward, exploring the edge of the ice-pack, she reached latitude 70deg. 20min. South and 85deg. West longitude, on the 28th Feb., and touched at Possession Island (71deg. 31min. South) without much difficulty. On the 3rd March she was finally blocked. The cakes of ice floating round the vessel froze together and soon formed an immense impenetrable field of ice. The ship was then 60 or 70 miles from the edge of the pack, and arrangements were made for wintering. By the 30th May she had drifted to 71deg. 36min. South and 87deg. 39min. West longitude. On the 17th May, the Sun set not to rise again until July 21st. Seals and penguins, although not numerous, afforded them a fresh supply of meat and contributed greatly to keeping

up the health of the ship's company. By October the cracks and channels and open spaces became more numerous, and the ship was from 700 to 800 yards from the edge of the great floe, about two miles in diameter, around which cracks were often formed. As no passage appeared to open in the beginning of January, it was resolved to saw out a canal in the ice to the edge of the open space, which had formed in the beginning of October. By the 1st of February of this year it only remained to saw through and blow up the blocks of ice nearest to the ship, but unfortunately a pressure then occurred, which so narrowed up the canal leading to the clear space, that it was impossible to get through. An ocean swell, however, set in directly afterwards, causing a slight movement of the ice, which on the 11th opened into a great crack; a clear space could be seen from the "crow's nest" of the ship, and by the 13th of the month they were able to give the propeller a few turns. On the 14th, they were able to move 15 or 16 miles towards the North, but on the following day they were again blocked, the pack being much broken up with swell, but still so close and compact that they were scarcely able to move the ship out of the way of some icebergs, whose proximity might be considered dangerous. During the whole time they were blocked in by the ice, the "Belgica" was only once subjected to severe pressure, and she was only in real danger for a few minutes; but now constantly struck by great blocks of ice, swinging with the ocean's swell, the little vessel was in a very uncomfortable position, so it was an immense satisfaction to every one when on the 14th March last the pack opened sufficiently to allow them to steam out and gain the open sea. From the edge of the pack to Terra del Fuego they did not encounter a single piece of ice, and on the 27th, then blowing a gale from E.S.E., they were able to enter Cockburn Channel, and reach the anchorage of Punta Arenas next morning at day-break, 14 days after leaving the pack. Captain Gerlache says:—"During this winter—the first that has been passed in the midst of Austral ice—we were able to conduct satisfactory magnetic operations, to form an important series of meteorological polar observations, and to make a good collection of specimens of pelagic and abyssal fauna, as well as of specimens of submarine deposits," and scientists are

looking forward with great interest to the speedy publication of the results of the voyage.

Germany is sending "an expedition next year, under the command of Dr. Drygalski, with naval officers well equipped in every respect," and the intention is for the British and Germans to work in conjunction with each other, probably taking by mutual arrangement, *separate regions* within the Antarctic Circle for their operations. It has been a disappointment that the British Government have not been able to see their way clear, to have this expedition carried out, as in the case of all previous expeditions, by the Royal Navy. The Admiralty at the same time gives the expedition its countenance and its support by supplying the instruments at their disposal. The cost, therefore, falls upon private liberality. The Royal Geographical Society started the list of contributions with a donation of £5000, Mr. Alfred Harmsworth gave a like sum, and many others have assisted, and we have recently been informed of the liberality of Mr. L. W. Longstaff, whose magnificent contribution of £25,000 puts an end to all uncertainty, from a financial point of view, as to the starting of the expedition. The plan submitted by the Germans, and accepted by the British, "is to winter on Victoria Land; to set out in the spring of 1901 on sledges towards the South Pole; to fix the location of the South Magnetic Pole, and to carry out a thorough exploration in *every branch* of science, the work to be continued for two years."

Australia has been appealed to, but no concerted action amongst the various colonies has been decided upon. I am happy, however, to be able to announce that our Premier informs me and authorises me to state that it is his intention to submit in the ensuing session, for the approval of Parliament, the appropriation of £1000, as Queensland's donation towards this great undertaking.

WESTERN AUSTRALIA.

Coming to Australia, the journey of the Hon. David W. Carnagie appears to be one of the latest contributions to the geography of our own continent, and is well worthy of note, as it is only quite recently that we have received a full narrative of his journey. Mr. Carnagie started from Coolgardie on the 9th July,

1896, and his journey differs from the work of previous explorers inasmuch as it was made from South to North, and again from North to South, over the desert of West Australia; all previous explorers (amongst whom I may mention our own esteemed fellow member, the Hon. A. C. Gregory, as also Sir John Forrest, Major Warburton, and Mr. Giles, and more recently Mr. Wells), traversed the country in an easterly and westerly direction. Mr. Carnagie, therefore, intersected the tracks of these previous explorers at various points, which he notes in his journal. The expedition consisted besides himself of Mr. Breaden as second in command, Mr. G. T. Massie, Mr. C. W. Stansmore, and "Warri," an aboriginal, with eight pack camels and one riding camel, and equipment and provisions for five months. He entered the desert proper at a place called Doyle's Well (in approximate longitude 132deg. 30min.), and immediately encountered "vast sand flats timbered with desert gums, a few quandongs and cassia bushes interchanging with long stretches of rolling sand ridges, high and steep in places, but of a far less formidable character than those met with later on; the one characteristic vegetation being spinifex. This continued as far as Mount Worsnop, and during this part of the journey occurred the longest stage of dry country—13½ days—during which time the camels were without water, and the members of the expedition were very hard pressed. The expedition traversed the whole of the country in a N.E. direction, as far as Hall's Creek, the official centre of the once populous Kimberley Goldfield, in latitude 18deg. 16min., which they reached on the 4th December, having covered a distance of about 1400 miles. After remaining there some months for rest and recuperation, they started again on the 22nd March, turning somewhat to the East and took a southerly direction as far as what was formerly marked as the probable outline of Lake Amadeus, where, however, no lake was seen. They then turned westward, running parallel to the Rawlinson and neighbouring ranges, then south-westerly, crossing their previous track near Mount Worsnop, and reached settled country at Lake Darlot township, then by easy stages to Coolgardie, having travelled upwards of 3000 miles, nearly half of that distance being through country hitherto unexplored. "The country generally," Mr.

Carnegie says, "is of a most unpromising and desert nature. From latitude 22deg. 40min. up to 20deg. 45min., there stretches a vast howling wilderness of high spinifex-clad ranges of red sand, so close together that in an average day's travel of seven hours, we would cross some sixty ridges, so steep that as often as not, the camels would crest them on their knees, and so barren and destitute of vegetation (saving spinifex) that even the camels were hard put to pick up a living." The average height of these ridges from trough to crest he judges to be at least from 50 to 60 feet vertical. The difficulties of travelling being intensified by the obstinacy by which these ridges hold to their E. and W. direction, causing infinite labour in having to cross the country dead against the grain, some days crossing no less than 86 of these terrible ridges. The great difficulty Mr. Carnagie had to encounter on his journey was, of course, the scarcity of water. *Yet he found natives* in nearly all parts of his route, who showed their appreciation of the value of the precious find by their decided aversion to divulge their sources of supply, which at their best are of the most meagre sort, and a somewhat novel mode of discovering water was adopted. Having surprised a native, or two if possible, if they refused to conduct the party to water at once, the expedition would continue on their course for the rest of the day, taking the captive or captives with them. A single night without water would soon bring them to reason. "One could be pretty sure," says Mr. Carnagie, "that in the morning he would be only too anxious to get started. These captures were a case of necessity—a matter of life and death to us; our guides were never cruelly dealt with, but as a rule dismissed with presents and well enough contented." In this manner two permanent waterholes were discovered, the first of which Mr. Carnagie named "The Empress Spring," in honour of the Jubilee year. He says:—

"A very curious water this—between two sand-ridges some 1½ miles apart, a low outcrop of white limestone, in which could be seen what appeared at first sight to be a series of three rock-holes, which one might easily pass within 60 yards and not notice. On further inspection, two of the three holes turned out to be circular entrances, 2 and 3 feet in diameter, leading vertically into a cave beneath: the floor of this chamber, which is 28 feet across, being some 20 feet from the surface, and covered to a depth of two feet with sand. From

the cave two passages run, one West and upwards, the other East and downwards. Along this latter passage one can just crawl, and at the end of it, some 50 feet from the surface, is a small pool of water, evidently a soakage from the surrounding country, and possibly a spring. Though only a small supply was visible, yet continual bailing did not appreciably lower the level of the water. Considerable work had to be done before we could get the water to the surface: the native bailed the water into a bucket, which was passed from hand to hand along the passage to the floor of the cave, and finally hauled from above to the surface. A rough ladder formed of mulga poles and branches had served the aboriginals to come and go, and all along the passage the remains of old fires could be seen."

The other, "Helena Spring," is considerably further North, and consists of a small basin in a surface outcrop of limestone formation surrounded by a little oasis, about 400 yards wide, containing plenty of herbage. The basin contains not more than 70 gallons, but on exhausting the supply, the water would rise again nearly flush with the surface. "What a God-send," says Mr. Carnagie, "was this spring to us and our tired camels. Without it, it is hard to say how we would have fared, for the camels were well nigh exhausted from the heat and want of food, and had been coaxed along with the greatest difficulty." The party had their first mishap near Mount Bannerman, losing three camels from poison plant, and on the 3rd November, a most deplorable accident occurred, resulting in the death of Mr. Stansmore, who was accidentally shot when hunting for game. His heel slipped on a steep piece of rock, and his gun falling forward, exploded, the charge entering his body, causing instantaneous death, to the indescribable sorrow of his comrades. Mr. Carnagie describes the country which he traversed in the following terms:—

"Once past the longitude (roughly) of 122 deg. 30 min. the character of the country, as well as of the rocks, undergoes a complete and entire change; and from there right away up to the old-established diggings of Kimberley, it is the same dreary monotony of sand and sand-stone. Coming back we fared no better, and I am forced to the melancholy conclusion that the greater part of the vast West Australian interior, as seen by us, is useless to man or beast; that a direct stock route between the Kimberley district in the North and the Murchison-Coolgardie fields in the South, can by no possibility be found.

It is no pleasant task to have to condemn as useless so large a portion of a prosperous colony; yet I must speak of the country as I have seen it,

and would remind you that West Australia contains many hundreds of square miles of valuable land, of which only an insignificant part has as yet been occupied.

His narrative is of great interest, exhibiting throughout instances of his qualities as a good explorer, remarkable pluck, energy, and determination in carrying out his plans. I am, therefore, pleased to notice that the Royal Geographical Society, at its last annual meeting awarded to him the Gill Memorial, in recognition of his services to Geographical Science.

I may mention here, as showing the cosmopolitan operations of the Royal Geographical Society, that two of its most prized medals have this year been awarded to two Frenchmen, it being somewhat remarkable that such highly esteemed honours should fall to men of that nationality in the same year. The Founders' Medal was awarded Captain Binger for the valuable work he did during his extensive journeys in the country bordering on the Niger. The Patrons' Medal was awarded to M. Fourean for his continuous explorations in the Sahara during the last twelve years.

NEW GUINEA.

It is doubtful if any country in the world has ever exhibited such extraordinary strides in the direction of civilization, as has the Eastern portion of New Guinea, during the short time it has been under direct British rule ; a leap, as it were, from a state of utter barbarism, involving constant inter-tribal wars, ferocious murders, cannibalism, and many other abominations of savagery, to a condition of peace and comparative progress. This has been due, mainly, to the systematic well-directed, and ceaseless energy and courage of its late Governor, Sir William MacGregor. And no small portion of it has been the outcome of his ardent love of geographic science, backed up by scientific attainments, which enabled him to establish on a sound and lasting basis, many matters that were previously entirely unknown, or that were in a state of doubt and uncertainty. His astronomical and other instruments were his constant companions on all journeys. To his native attendants, "Catch 'em star," was, of course, a great puzzle, and many were the simple questions put by them from time to time respecting his doings in this connection. "Where

he put 'em?" "What want 'em for?" "What he do when catch 'em all?" and so on. What we call a shooting star, led the native mind in this direction:—"Ugh, ugh, that fellow run away; no catch 'em; catch 'em by and bye; never mind, plenty more."

Having speedily brought the coastal tribes into subjection, Sir William directed his attention to the vast field of unknown interior, whose tumultuous masses of wild rugged mountain ranges, almost inaccessible peaks, precipitous ravines, tortuous valleys, and rushing streams had an irresistible attraction for his adventurous spirit.

Members of the Society are already familiar with his first ascent of Mount Victoria in 1889, an interesting account of which was given by my predecessor, Mr. J. P. Thomson, in the session of 1889-90, and which appears in the journal of the Society.

Sir William has made several interesting expeditions into the interior, but the two to which I wish to direct attention are his journeys right across the S.E. portion of the continent.

The first of these was undertaken in 1897. Leaving Tamata—the most northerly station on the N.E. coast, which is situated on the small affluent of the Mambare River, about 50 miles from its mouth—on August 11th, four days travel over rough country, intersected by numerous creeks, brought the party to Simpson's store, on Mount Otovia (latitude 8deg. 35min. 30secs.) This place, about 1600 feet high, is named after an enterprising miner, who with seven others penetrated thus far into the wilds in search of gold some years ago, cutting their road as they went. It is about 30 miles from Tamata, and the fact that it took Sir William's party four days to cover that distance will convey some idea of the character of the country. Sir William says that the work "reflects great honour and credit on Mr. Simpson and his companions." . . . . .

The road traverses extremely difficult country at many places, so difficult that the traveller has sometimes to trust his whole weight to a single cane or small bush in ascending or descending a cliff, or has to advance by means of a very rude ladder. It must have occasionally taken a good deal of time to find a way by which one could pass at all. Mr. Simpson never could tell what he would come to next, perhaps a hopelessly inaccessible cliff, probably a wild and savage tribe, or an

impassable torrent; and if anything went seriously wrong, he was sure he could obtain no assistance, procure no relief, until it would be too late.

Simpson (whose death last year is noted by Sir William with regret) and his party afterwards continued the road some 20 miles further.

It will be remembered that the naming of Mount Victoria was the cause of some contentious correspondence a little while ago. Sir William, however, defends his action, and shows that to the traveller, the naming of the highest mountain peak in the country by a distinctive appellation, such as "Mount Victoria,"—none more fitting could be found—is absolutely indispensable.

Resuming their march on the 17th August, the country became more rugged and difficult, their hardy leader—whose inclination is always to minimise the troubles and dangers of his travel—describing it as "very rough, . . . exceedingly steep ravines of great depth that try the strength and endurance of the unfortunate carriers." On the 20th the party camped at the junction of the Yodda and Chirima rivers (latitude 8deg. 39min. 15secs., about 40 miles from Tamata), which here form the Mambare. Several miners were met who gave encouraging accounts of the prospects of the district from an auriferous point of view. Owing to sickness, wet weather, great difficulty in getting true bearings to Mount Victoria and other causes, the party were detained here until August 28th, but the time was utilised in building a substantial log store-house. A visit was also received from the Nenela tribe—the only one actually settled on Mount Scratchley, at a height of from 3000 to 4000 feet—of whose appearance, dress, ornaments, and peculiarities an interesting account is given in the report. They were apparently of a very friendly and amicable disposition. Nine miles progress on the 29th in a southerly direction brought the party to the McLaughlin, a small stream where most of the miners were working. Next day, a spot called the "Look out," at that time the miners' furthest inland camp (about 2000 feet above sea level, in latitude 8deg. 45min. 33secs.) was reached. The natives in the vicinity showed a friendly disposition—presents of taro, betel nuts, and cocoa nuts having been hung on the trees as peace offerings to the

miners. The temperature at 7.30 a.m. was 67deg. The ascent of Mount Scratchley was commenced on September 1st—at 5000 feet, the temperature was 64deg. at 2 p.m., and 57deg. at 7 a.m. From this height up to 9000 feet they had frequent visits from a beautiful bird, *Epimachus major*; at 5500 feet they first met with the circus-like playground of the bower bird. At 7700 feet they came into contact with that abomination to the traveller, the trailing bamboo, growing side by side with the equally detestable lawyer cane, and the harmless pandanus. (Temperature at 7 a.m., 53½deg.) On September 2nd they passed through "a zone of short, gnarled, twisted trees, interlaced and crossing each other so closely, and covered so thickly by moss, that much of our walking," says Sir William, "was done on these, often three or four feet above the ground. On this path one could at any moment half disappear into the ground. . . . . . In spite of the cold (49deg. at 7 a.m.) there were numerous leeches and mosquitoes in camp at 9700 feet." At sunrise on the 10th the thermometer stood at 40⅓deg. in the shade, at an altitude of 10,200 feet, and there was some ice on the water. On the 12th camp *was pitched on the top of Mount Scratchley*—12,200 feet—the highest peak being 12,850 feet. The mountain is described in the following terms:—

On the top there is probably an area of not less than two score square miles above 10,500 feet high, the greater part of which is covered by grass, bare rocks, and clumps of trees and shrubs. There are at least three small lakes on the top, the largest having an area of probably fifteen to twenty acres. The appearance of the mountain top from our first camp was most picturesque. Sharp ridges of a yellowish brown, sometimes so large as to become small hills, covered the broken ground in all directions. The hills and ridges bristled with rugged, sharp, grey rocks on which were often little heaps of broken up, white quartz. Between rocks and ridges, and in some of the intervening valleys, there were clumps of a very strange weird-looking forest. This consisted almost entirely of cypress trees of a peculiar form. The top of each tree is a broad crown, quite flat and even on the upper surface, light-green in colour, with a tinge of yellow, while the stems, covered by lichens, are of a hoary grey. The branches are gnarled, and the stems short in proportion to the width of the crown. These trees do not grow close together, but rise on the sloping ground with the regularity of steps on a staircase. They are generally protected from the wind, and not a leaf

seems to move on them, so that the whole view suggests irresistibly the idea of a petrified landscape.

Among familiar birds noticed on the top of this mountain were larks, swallows, sparrows or finches, ducks, and woodcocks; but the great majority of the birds were new and unknown to us. Probably over a score of different grasses were collected; three or four daisies; as many kinds of buttercups; many heaths, etc. Probably the most interesting flower at that altitude is a rhododendron about a foot high that bears bunches of scarlet flowers.

There are a few wallaby, but they are seldom seen. They are quite different from those met with in the lower country. At an altitude of something over 10,000 feet we first heard the howling of wild dingoes. Traces of these animals are met with everywhere, but the only one we really saw was a large black dingo.

From Mount Scratchley they made for Mount Victoria, which Sir William again ascended, and the party camped on the top on the 20th; but two days in a strong piercing wind, charged with dense clouds of penetrating mists or drizzling rain, making the cold "cruelly severe" (it being impossible to erect a tent) was quite enough for even tough Sir William, especially when—as he says, in the bitterness of his heart—"all attempts to obtain true bearings, to my great disappointment, failed utterly." Leaving this inhospitable spot on the 22nd, and returning to their original course, nine hours walking took them to Winter's Height, where they camped until the 25th. Nothing of special interest appears in the report of the rest of the trip except the great difficulty of cutting a track through trailing bamboos down the first 3000 feet of Mount Knutsford; but Sir William gives some interesting particulars respecting the Gosisi and Tobiri tribes, who live at the foot of the mountain, and are described as "physically the best men yet met with in this colony." As illustrating their idiosyncracies, it is mentioned that they fled on seeing anyone attempt to write with pencil and paper—and that a chief to whom a shirt had been given put it on, but immediately took it off again, apparently under some superstitious fear—probably that it would make his skin white, or that he was to be taken away. The party arrived at Galley Reach, an inlet about 30 miles to the West of Port Moresby, on September 13th, the journey thus occupying 34 days from Tamata.

The second trip across the island was somewhat hurriedly

organised last year, the primary object being to relieve Mr. Wriford (formerly Commandant of Police), and prospecting party, four in all, who had been first robbed and then hemmed in by the warlike Goromani tribe. The relief party, consisting of 110 individuals, mostly carriers, left Douro village on Galley Reach on September 21st, 1898, and reached Kone, a village at the S.W. extremity of the Owen-Stanley Range (latitude 9deg. 30min. 52secs.), the same night. The thunderstorm season had set in, and all efforts to push on rapidly were counteracted by the nature and condition of the road. Wet, sloppy, slippery, and precipitious, it took the more heavily laden carriers five hours next day to cover six miles; and although early starts were made on the 22nd and 23rd, only eight miles were traversed each day. Writing on the 27th, when the weather had become favourable, Sir William, under whose seemingly rough exterior, exists as kind a heart as ever beat, unconsciously left a glimpse of this to be seen, when he places on record the fact that so steep and painful was the descent of the mountain that "many of the carriers cried like children. At night they were all extremely tired, utterly dispirited and dejected by the difficulties of the path, although the weather had been good, the road dry and already cut and the distance certainly not over five miles." The next stopping place was Iritumuni, but having heard that one of the beseiged men had been killed by the natives, the party pushed on by the most direct track to Wriford's camp, situate below Mount Scratchley, which was reached on September 30th—the 10th day from Douro, the only noteworthy incident during the last two days being the discovery of several dead bodies placed, native fashion, in cages on a platform, from which the party, for obvious reasons, made a wide berth.

The beleagured men were found all right. Although one of them had been speared and clubbed by the enemy, he was recovering. It was stated that three of the Goromani warriors had died from shot wounds inflicted by the miners, and that the tribe were preparing for a final attack when the relief party arrived. So closely had they been watched that Sir William's party dare not venture outside their log house to try to cut down the trees which sheltered their enemies. Fortunately they were able to catch sufficient rain-water for drinking.

The attack on Goromani is thus described: —

Nearly the first two hours of our march was down a long forest-clad ridge, which concealed us from the village of Goromani. Just before emerging into view the constables were made to leave their knapsacks, and with only their rifles and ammunition they were ordered to rush on the village. This they did in splendid style, led on by Corporal Sefa, who took them forward at headlong speed.

They speedily drove out all the warriors they found there, chasing them entirely off the Goromani hill. But a body of their warriors, led by their well-known war chief—the man that had held the hands of the sick miner while the others smashed his head with clubs—had secreted themselves near the main path, half-a-mile above the village, probably with the hope of sallying forth when not expected, were met and encountered by Corporal Kasavi, who was supported by the cooks, the chief of Suku, and three or four constables of his own party.

The great war chief was said to have come pluckily on, but he received a bullet in the body, and was instantly cut down by the half-axe of the chief of Suku, a weapon he had carefully carried from Suku for that avowed purpose. Soon two or three of his companions also fell, and the detachment was completely routed, leaving their arms on the spot. In half an hour after we emerged from the forest there was not a living native of Goromani on the hill.

The constabulary were supported by Mr. English and Mr. Kelly, as well as by the two Europeans of Mr. Wriford's party, Mr. Nettle and Mr. Peel, but no European in boots and trousers could quite keep up at the tremendous pace at which the constabulary, under Corporal Sefa, went down that long, hard ridge. The tribe was to a large extent taken by surprise, and thus offered less resistance than might otherwise have been the case. They felt at once that an overwhelming force was upon them, and broke away and fled for their lives, leaving several of their number dead on the ground. Altogether seven or eight of the Goromani warriors were killed.

The Goromani refugees must have had a hard time of it, for being a fighting and aggressive tribe, at whose hands many of their neighbours had suffered from time to time, none of the latter would shelter them. The lesson thus administered had, therefore, a most salutary moral effect on surrounding tribes of turbulent spirit, by exhibiting the power of the Government.

Here a new kind of food, consisting of great masses of seed of a hitherto unknown species of pandanus, was found, particulars of which, Sir William gives in his report.

Referring to the locality, he says: —

There seems to be no doubt that this part of the country would be

suitable as a permanent settlement for the white man. It is the first district of this kind that I have seen in the colony.

There can be no question that the fruits and products of temperate climates could be grown there. Everything would seem to favour the idea that it is a healthy region. Building materials and water power could be had almost anywhere. Much of the country is probably too steep for grazing cattle, but there are considerable areas of sloping land, at altitudes of from 5,000 to 7,000 feet, offering good soil and fit for cultivation.

There are, of course, no mission stations in that part of the country, although it offers such a magnificent field for mission work. But on the coast, nearly opposite th's same district, one mission thinks it its duty to thrust its missioners into native villages where there is already a missioner of a different denomination.

A few objects of interest, illustrative of the habits and life of these natives, were secured for the official ethnological collection. The leg bones of deceased relatives are worked up into long pins, which are stuck into the mass of woolly hair over the ear, a plume of coloured feathers being made fast to the blunt projecting end. This was to me a new use of the human skeleton. They use well-made stone mallets for the manufacture of native cloth. The latter they convert into sashes, mantles, and capes. They have many feathers of the long-tailed birds of paradise. These they carry in bamboos or put between frames similar to those used by botanists for collecting or pressing plants. They sleep in well-made, strong hammocks, made of thick twine, which they manufacture themselves. They have no pottery, but do their cooking in stone ovens in the earth. They have some clubs of a type peculiar to the district, and they have plenty of the usual nets for hunting and for carrying food, etc. Specimens of these articles have been obtained. The betel palm and the cocoanut were not seen there.

Thenceforth, until their descent into lower country, the party suffered terribly from cold.

Writing on October 17th, he says:—"It had rained in torrents all night, and the whole of the undulating plateau, forming the top of the Wharton Range and of Mount Scratchley, was literally like one vast wet sponge." Notwithstanding this, a large amount of geographical work was done. On Mount Scratchley things were even worse:—"I was obliged to leave the camp near the top, because we could not there obtain any firewood, except trees of the myrtle order, which would not burn. At night, all the pools became covered with ice, and a searching wintry wind swept across the bare plateau."

Here, again, he says, some of the carriers "cried like children." So it went on; his note respecting the 23rd being:—"It rained and blew hard till morning, without actually freezing, though the wind was so cold that no one could sleep. The camp was as full of groans and complaints all night as if it had been a place of torment."

The other matters noted in this report are:—The scarcity of life on the great mountain tops; roads "dangerous from the frequency with which one fell through the bottom of them, that is, through roots and moss sometimes three feet or more"; discouraging reports from the McLaughlin district, only small patches of gold having been found; fair prospects found in Yodda Valley, but natives decidedly hostile; crossing flooded rivers on rafts, etc.

Sir William concludes as follows:—

> The route taken was dictated by the circumstances and urgency of the case. It is one that it would be unwise for any one to follow who merely wished to cross from the south coast to the Mambare watershed. For carriers it is difficult and exhausting in a high degree, and would be so even for a party unencumbered as we were by shifting two additional large camps across the great mountain plateau. One thing was seen clearly: that the coastmen are poor carriers generally, and that they are quite unfit and unsuitable for the high altitudes. This journey occupied in all 51 days.

These particulars will convey some idea of the labours and trials attending New Guinea exploration, but by no means a complete one, for scores of "little worries," arise every day which try temper and health to the utmost.

I am sure it will be of interest to the public to know that the whole of the Cartography of British New Guinea, with the exception of some islands to the eastward, has recently been reconstructed from surveys and observations made by Sir William, or under his directions, and that the hydrography has also been added to by many soundings.

Much still remains to be done, not only in the way of working up details, but even acquiring a general knowledge of the country and the coast, for instance:—Lying between Normanby Island and the Louisiade Archipelago is a large space of unsurveyed waters extending N.E. as far as Marua, or Woodlark Islands, about

8,000 square miles in extent, dotted with islands, the principal of which are called the "Conflict" and the "Bouvouloir" Groups. Sir William MacGregor commenced a survey of these in 1896. Very little is known of them except by report, and the survey of these would be a fair subject of interest for our local Geographical Society. H.M.S. Beagle visited these waters in 1881, and H.M.S. Curacoa in 1893.

There are other matters I would like to have touched upon, but time will not permit. I would like, however, to suggest that the Society should take up the question of the resumption of the trigonometrical survey of the colony, which was commenced in 1883. In that year the Surveyor-General measured a base line, and a considerable amount of work was performed, but there has been a cessation of operations. All European countries, and even far-away countries like Japan and others, have taken this matter up, and the other colonies have also done a great deal in this way. Our land laws, the Real Property Act, and our modes of transfer of land, are as far as they can be excellent in their way. From them the history of any piece of land that has ever been granted by the Crown, or brought under the operations of the Act can be traced; but what is wanted more than all is a means of fixing the thing itself—that is, the land itself. And the only way in which this can be identified is by careful surveys by triangulation. There should be attached to our Survey Office a better astronomical observatory than we possess at present. This is an essential, because, not being able to carry on triangulation, a great deal has to be done by telegraphic signals, and it requires accurate observations at the Brisbane station as well as at the stations away in the country. The matter has been hung up ever since 1893, the only reason being a scarcity of money; but we are getting into a little better circumstances now, and I think that if the Society exerted itself and brought the matter prominently before the Government and the public, and showed the utility and the absolute necessity for it, I think the Society might be successful in getting it revived. It has been held in abeyance in New South Wales, too, but they have lately recommenced operations, and are connected with Victoria. Our triangulation extends as far as the Southern border, and if New South Wales continues to work northward, and we

start ours at the same time, working northward, by the time the New South Wales surveyors are here we shall be near Rockhampton with ours, and we would be able to bring in about 17deg. meridian, which would be an immense stride in connection with the geography of these colonies. (Applause.)

His Excellency, Lord Lamington, in moving a vote of thanks to Sir Hugh for his very instructive address, said it had added much to their general information. Sir Hugh had touched on three important subjects, and quite believed that he could, as Sir Hugh had said, have said a great deal more; in fact, when one got on to geography it was really difficult to say how far a person might not dilate. So far as the survey of Queensland was concerned, he thought the Society should take in hand the awakening of interest as to the necessity of having a proper trigonometrical survey made. If the other colonies were working in this matter it was the more essential that this should be done. Referring to a statement made in Sir Hugh's paper to the effect that the Premier had informed him and had authorised him to state that it was the intention of the Government to submit to the approval of Parliament a vote of £1000 as Queensland's donation to the Antarctic expedition, his Excellency said they would all be glad to hear that Queensland had shown herself to be in advance of the other colonies in looking beyond the immediate present or of a direct and prompt return for any money expenditure in the way of a grant as proposed by Mr. Dickson. (Hear, hear.) In his opinion the Australian colonies were showing a lack of the sense of proportion of things in not coming forward unitedly and with vigour to support the Antarctic expedition. The undertaking was one of intense interest to the whole world, and amongst those in the world there was no doubt that Australia was particularly interested in learning more about Antarctic regions. As Mr. Wragge had said, it was necessary in the interest of meteorology that we should have a greater knowledge of those vast territories which lay around the Southern Pole. It was necessary for the whole purpose of science—for botany, biology, and particularly for a greater acquaintance with the magnetic forces of the world. If Great Britain felt the necessity for sending out the expedition in cooperation with Germany, surely Australia should be more alive to taking some share in it. If small countries like Belgium and Sweden and Norway were sending expeditions to Arctic regions, he thought this great continent should appreciate its share in exploratory work, and show its wish and desire to take part in what was really a traditional heritage—the exploration of Arctic and Antarctic regions. (Hear, hear.) He was glad to learn that the position of the Society was financially strong, and that perhaps with the increased accommodation it now enjoyed there might be still more support given to it by the general public. He was pleased to learn, too, what he had not known before—that the Government was

going to show some support by giving a small annual grant; but he thought it was chiefly in respect of an annual increase of members that support was mostly wanted. People living in Queensland ought to be more particularly desirous of geographical information, for they lived in a very large territory, some parts of which were practically unknown, and it offered great scope for any ardent spirits who would like to take up what he might call a sort of amateur exploration. He wondered that more young men did not take up surveying with the object of obtaining information of a scientific character, and in this connection he laid particular stress on the great field which New Guinea presented for this sort of thing. In the recollection that geography might really be defined as a description of the world in all that regarded mankind, and also because of the knowledge of the various changes that had taken place on the earth's surface in historical times, it was essential for all to show interest in the propagation of geographical knowledge. (Applause.)

Mr. J. P. Thomson seconded the motion. He said he had only that day received information from the old country to the effect that the Imperial Government was not only going to support the proposed British Antarctic expedition by lending all instruments and other appliances, but intended also to contribute a substantial money grant of about £45,000. Mr. Balfour, in his remarks to the deputation, gave a most comprehensive account of the attitude of the Government towards the expedition, and explained that it was one of entire sympathy. Sir Hugh Nelson had apologised for not being able to deliver a better address than the one to which they had just had the pleasure of listening, but the deliverance needed no apology at all, for it was really one of the most comprehensive, the most instructive and interesting papers that had ever been read from the chair of the Society. In point of fact, the President had shown at once how well qualified he was for such a position by his thorough grasp of the subjects with which he had dealt in the eloquently expressed Presidential Address, prepared at very short notice too, and presented to the meeting in the happiest possible style. He (Mr. Thomson) was glad to welcome among them Mr. G. R. Le Hunte, the successor to Sir William MacGregor as Lieutenant-Governor of British New Guinea. He had been officially associated with Mr. Le Hunte 18 or 20 years ago in making astronomical observations in the Western Pacific, and knew him to be an enthusiast in work of the kind. He was sure that Mr. Le Hunte would give a good account of himself in British New Guinea, and that the geography of that interesting country would find in him an able and enthusiastic exponent. The motion was carried by acclamation.

Sir Hugh, in replying, thanked those present for the way in which they had received his paper. Reverting for a moment or two to the subject of Antarctic exploration, he said he had seen a very good suggestion the other day as to the way we might very well assist the expedition. He said it was not essential that the ships should winter amongst

the ice, although of course they must be built and be prepared for such an emergency. But he thought the intention was, if the arrangements would suit, to land the various parties at different points, and then the ships would come on to Australia, spending the winter, and refit and take in such supplies of stores as might be necessary. The only other place where this could be done was in the Falkland Islands, but he believed they would much prefer to come on to Australia. He thought it would be a graceful action on the part of Australia, if such a programme should be carried out, to offer the ships such of the facilities we had in the way of docks, undertaking to do the necessary work free of charge. He thought it would be worth while for the Society to represent the matter to the Premier, and ask him to ascertain how far the other colonies are willing to go in this direction.

PROCEEDINGS

OF THE

Royal Geographical Society of Australasia,

BRISBANE.

FOURTEENTH SESSION.

NOVEMBER 11th, 1898.

Major A. J. Boyd in the chair. The minutes of the previous Annual General Meeting were taken as read, and confirmed.

The following correspondence from His Excellency Sir William MacGregor, Lieutenant-Governor of British New Guinea, was read and discussed :—

" *RE* THE DISCOVERY OF THE PURARI RIVER, BRITISH NEW GUINEA."

" [COPY.] "

" BRISBANE, 24/10/98.

" The Secretary,

" ROYAL GEOGRAPHICAL SOCIETY OF AUSTRALASIA

" (Queensland Branch).

" DEAR SIR,—

" Before I finally leave this part of the world, I wish to deposit with your Society certain papers that will be sufficient for all time to establish the historical fact that the Rev. James Chalmers was the original discoverer of the Purari River. This is necessary on account of a printed slip, addressed in 1895 by Mr. Theodore Bevan to the Hon. Robert Philp, M.L.A., in which the former calls on the latter to invite an explanation from myself for having called Mr. Chalmers ' the original discoverer of the great Purari River.' Neither Mr. Philp nor any other person has asked me for any explanation. As, however, Mr. Bevan has no hesitation in saying ' the statement is distinctly untrue,' I now enclose herewith clear proof that it is an uncontrovertible truth. There are scores, hundreds of other witnesses available to substantiate it, leaving aside altogether the statements of the Rev. James Chalmers, which of themselves will convince any unprejudiced person.

" 1. I enclose a copy of Friederichsen's map, published in Hamburg in 1885, about two years before Mr. Bevan visited the Purari. You will notice on that map, prepared and published abroad, the names of the

Alele, Aivei, and Panaroa, and in a dotted line the Wickham. This shows beyond the shadow of a doubt that these mouths of the Purari were well known to geographers years before Mr. Bevan ever saw them.

"2. I enclose copy of a letter supplied to myself by Captain Dubbins, a man whose veracity Mr. Bevan will not question. The original was addressed to the Secretary of your Society. This shows the origin of the data on which Friederichsen's map, as regards this river, is compiled, and that Mr. Chalmers was the head of the party that made the discovery which Captain Dubbins put upon this map. It would also seem from the note of Captain Dubbins that Mr. Bevan had heard of the discovery by Mr. Chalmers.

"3. A copy of a note to myself by Mr. Hugh Milman, which leaves no reasonable doubt that Mr. Bevan knew of Mr. Chalmers' discovery, is also enclosed.

"4. I enclose a solemn declaration, made by a native chief of Port Moresby who accompanied Mr. Chalmers on one of his visits to Maipua, where they slept after having sounded the Panaroa. This was before Mr. Bevan's arrival in New Guinea.

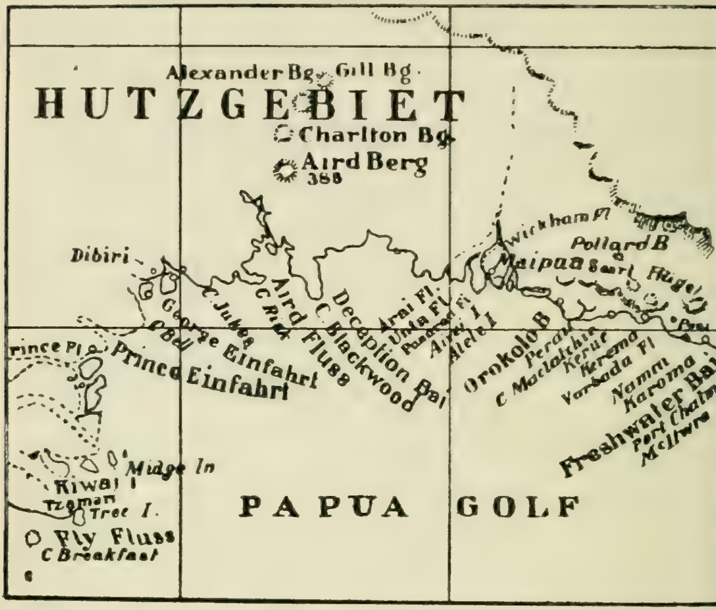
"5. A solemn statement by Waburi, a Chief of Hanuabada, who accompanied Mr. Chalmers to a number of villages on the Purari Delta before Mr. Bevan went to New Guinea.

"6. I enclose a reprint from *Petermann's Mitteilungen*, 1896, Heft 2, where, page 47, you will find the subject correctly and dispassionately stated by a Greek authority, whose only interest in the question is the one I myself possess—that the truth be established. It will be noted that the editor takes practically the same view of the question that I have done myself, viz. : 'There can be no doubt that Chalmers has been the true (real) discoverer of the opening arms of the Purari, while Bevan, by travelling over the same, first furnished proof that they did not belong to the Fly River, but were formed from a substantive river.' I only wish to add that I did not inspire *Petermann's Mitteilungen*.

"I have, etc., etc.,

"WM. MACGREGOR."

(EXHIBIT No. 1).



[Copy of a part of Friederichsen's Map of 1885, showing the Panaroa and other mouths of the Purari River].

(EXHIBIT No. 2).

[COPY].

"YULE ISLAND, BRITISH NEW GUINEA,

"SIR, "*June* 30*th*, 1896.

"As I understand that Mr. Theodore Bevan claims to have discovered the Purari River, I beg to state that in the year 1877, in company with the Rev. J. Chalmers, we discovered the mouths of that river, and as I described them, so they were afterwards marked on the Admiralty charts. Mr. Bevan could hardly have failed to observe them so marked; the positions may not have been strictly accurate, but there can be no doubt that it was the Purari River we saw. At the time I was master of the London Missionary steamer *Ellengowan*. Some natives on board at the time told us they were mouths of one river.

"I may also state that when Mr. Bevan was about to start in the *Victory*, Mr. Milman, who was then Government Resident at Thursday Island, asked

me to accompany her to the coast, but I declined when I found he intended to explore this river, as I thought it probable Mr. Bevan might benefit by my experience and take all the credit to himself.

"I have the honor to remain,

"Yours faithfully,

"(Signed) H. DUBBINS.

"THE SECRETARY,
"ROYAL GEOGRAPHICAL SOCIETY,
"BRISBANE."

(EXHIBIT No. 3).

[COPY].

"BRISBANE, *4th August*, 1896.

"DEAR SIR WILLIAM,

"Your letter of 1st July only just received. My memory fails me about Captain Dubbins, but how Bevan can claim to be the discoverer of the Purari River I cannot see, as when I took him across, we steered across direct to the mouth of the river, as laid down on the chart, compiled, as I always heard, from data supplied by Chalmers.

"I have just been reading, with much interest, your account of meeting with Tugeri people, and wish I had been with you at the time; their inroad should be effectually stopped for many years to come at any rate. With compliments,

"I am,

"Yours faithfully,

(Sgd.) "HUGH MILMAN."

(EXHIBIT No. 4).

[COPY].

"PORT MORESBY, *6th August*, 1898.

Statement made by Arudaina, of Hanuabada (or Poriporina) village. And on being duly affirmed, states :—

"The year before the British flag was hoisted at the Mission House by Commodore Erskine, the Rev. J. Chambers accompanied us on a trading expedition for sago, on board of the *Lokatoi*, owned by Aku ; our first stopping-place after leaving Port Moresby was at Gebada, where we sleep for the night. The next day we went on as far as Yokeu and sleep ; the next half day and night we were at sea, and sailed west as far as Vailala. Mr. Chambers went on shore and sleep in the dubu, I remained on board of the *Lokatoi* ; we remained two days. We then crossed the river by a small canoe, Mr. Chambers (Aruaku), Johnny, and myself, walked to Olokolo, where we sleep for the night in the dubu. The next day we started for Maipua, accompanied by a native of that place, by the name of Kunumo. We called from Auvwe to Areri for a canoe, which took us on board and on to Aivi. We meet the Chief, Ipai Vai

Kane. of Maipua, at Apepi; he came on board, when we started again for Maipua, where we sleep for the night. The next day we left in Ipai Vai Kane large canoe, and paddled up the Panaroa, taken soundings; we went up a few miles and returned to Maipua and sleep for the night. The next day we returned to Olokolo and sleep, the next day we returned to the *Lokatoi*. Mr. Chambers remained with us and saw a few canoes built, when Charles Kidd came in to Vailala with a boat, which Mr. Chambers returned in.

"ARUDAINA (his X mark),

"Taken before me, this sixth day of August, 1898,

(Sgd.) "A. C. ENGLISH,

"Justice of the Peace."

(EXHIBIT No. 5).

[COPY].

"PORT MORESBY, *August 5th*, 1898.

Statement made by Valuri, a native of Hanuabada (or Poriporina), who being duly affirmed, states that:—

"I visited the following villages on the Arere River, in company with Mr. Chalmers, Aruaku, and my son Aruadaira:—No. 1, Maipua; No. 2, Iari; No. 3, Kairu; No. 4, Kopunairu; No. 5, Okeravi; No. 6, Kaipuravi; No. 7, Waimoaru; No. 8, Era; No. 9, Keme; No. 10, Kerevu.

"Maipua village has eight long houses or dubus, and the name of the Chief is Ipai. The Chief, Mama, went with us as far as Iari, then returned. The above villages were visited by us before Mr. Bevan came to New Guinea.

"Made this fifth day of August, 1898, before the undersigned, one of Her Majesty's Justices of the Peace.

"WABURI (his X mark,),

(Sgd.) "A. C. ENGLISH, J.P."

(EXHIBIT No. 6).

"In einer kurzen Flugschrift wendet sich *Th. F. Bevan*, der bekannte Erforscher zahlreicher Flufsläufe des Papua-Golfes, gegen den Administrator Dr. Wm. McGregor, weil derselbe den Missionar J. Chalmers als Entdecker des Purari, welchem Bevan den Namen Queen's Jubilee River gab, bezeichnet hatte. Bevan gibt jedoch selbst zu, dafs Chalmers vor ihm die zahlreichen Mündungsarme in der Gegend von Bald Head erreicht habe, die er jedoch nicht als einem selbständigen Flufssystem entstammend, sondern als dem Fly-Delta zugehörig ansah. Es unterliegt damit keinem Zweifel, dafs Chalmers der wirkliche Entdecker dieser Mündungsarme des Purari gewesen ist, während Bevan zuerst durch die Befahrung derselben den Nachweis lieferte, dafs sie nicht dem Fly River angehörten, sondern, von einem selbständigen Flusse gebildet wurden."

The HON. LIBRARIAN reported the receipt of some 285 publications in exchanges and donations since the previous meeting.

Mr. KENDALL BROADBENT read a paper on The Geographical Range of some Woodpeckers," and exhibited some very rare specimens of these birds.

APRIL 10th, 1899.

Mr. C. B. LETHEM, C.E., in the chair.

The minutes of the previous monthly meeting were read by the Hon. Secretary, Mr. J. P. Thomson, and duly confirmed.

ELECTIONS:—Hon. member, His Highness Prince Roland Bonaparte, Paris; hon. corresponding member, His Excellency the Hon. G. R. Le Hunte, C.M.G., Lieutenant-Governor of British New Guinea; members, Hon. Robert Bulcock, M.L.C., Messrs. Wm. Lee Crompton, L.S., John Davies, and George Hart Taylor.

The following interesting letter from Mr. D. S. Thistlethwayte was read by the Hon. Secretary:—

"District Engineer's Office,
"Cairns, February 27th, 1899.

"DEAR MR. THOMSON,—

"Many thanks for your kind note of the 6th instant, welcoming me back again. On returning to Brisbane I had fully intended calling to see you, but instructions to come up here reached me so soon after my arrival that I really did not get the opportunity, having as you can readily imagine many pressing matters to attend to. One reason, and by no means the least, I wished to see you, was to thank you for, and render some account of, the letter of introduction to Professor Jimbo of the Tokyo University, with which you so kindly furnished me. I took an early opportunity of calling on the Professor soon after reaching Tokyo: fortunately he is a very efficient English scholar. He showed me over the rooms of the Society, which were very plain, and somewhat crowded with book shelves and cases, having to provide for about 2500 sets of works, besides many valuable maps. He also asked me to accept for *our* Society the latest official report by the Japanese Government on the Island of Formosa; this I will hand over as soon as I return. As it is, however, printed in Japanese characters I do not suppose there will be any great 'run' on it by our members.

"Professor Jimbo would be very glad if we could spare him any recent work on Australian exploration, also any diagrams of Aboriginal drawings. He has the volumes of our 'Proceedings,' commencing from 1888 (No. 6), and would be pleased if he could be supplied with the previous numbers. He would be happy to send you any numbers of their 'Transactions' that are wanted in our library.

"He kindly offered to take me over the Imperial University, an offer I gladly accepted.

"The University consists of a set of handsome red brick buildings, standing in the extensive and once beautiful grounds of a former Daineyo of Kaga. The grounds are now in a state of transition, their quaint picturesqueness having to give place to the utilitarian requirements of the times, still there are some beautiful trees, and one especially pretty sheet of ornamental water still left. The basis of the institution was the "Bansho-Shirabe-jo," "*Place for the Examination of Barbarian Writings,*" founded by the Tokugawa Government in 1856. This name was altered to "Kaisei-jo," or "*Place for Developing and Completing,*" in 1863, thus showing that in those seven years the Japanese had begun to look on the value of European learning with greater liberality. Many modifications and improvements continued to take place, so that to-day the Institution is on a thoroughly modern footing, and comprises Colleges of Law, Medicine, Engineering, Literature, Science, and Agriculture, where lectures are delivered by a large staff of professors of different nationalities and in different languages. The Professor took me through the various departments, and introduced me to the gentlemen presiding over each, as well as to the President of the University.

"The museums attached to the different departments are fairly representative, but that which interested me most was I think the Seismological Department, presided over by the genial and most obliging Professor Tanakadate, who spared no pains in explaining to me his very complete and sensitive set of instruments for measuring the direction, duration, and force of earthquake shocks and tremors. The Seismograph is always at work, and by a clever combination a diagram of both the lateral and vertical motion of any earth disturbance is recorded on smoked paper.

"The morning spent at the University was a very interesting and instructive one.

"Might I trouble you to hand the enclosed cheque to the Treasurer, and trusting you have thoroughly recovered from the effects of your late illness, believe me,

"Yours very sincerely,

"D. S. THISTLETHWAYTE."

Capt. W. C. Thomson read a paper on "Voyages to the Antarctic Regions," of which the following is an abstract:—

The success attending the expedition in the Fram into high north latitudes has aroused the spirit of inquiry and discovery into Antarctic regions, and much has been planned and suggested as to the best mode of making an examination of this "terra incognita."

Perhaps one of the principal reasons that so little is known of this part of our globe is its great distance from the centres of civilisation, and the lowering of price of whale oil and other Arctic and Antarctic products that it is very doubtful if whale fishing would pay in the present day. As a proof of that, witness the decrease of whaling tonnage during the last thirty years.

Of the scientific harvest to be reaped by an expedition to the South Pole, who can say what may be garnered, but it will require to be undertaken with facilities which are at present not at our command.

When we come to remember the experiences of Cook, Ross, Wilkes, and others who sailed right up to the unsurmountable cliffs of ice, and Ross, when he reached within sight of the volcanoes, which he named Mounts Erebus and Terror, and were compelled to return, we cannot be sanguine of the success of any small expedition, for in undertakings of this kind they must not be hampered by commercial interests.

Of the region beyond latitude 70deg. comparatively little is known. The first vessel that we know of that reached as far as latitude 64deg. was one of a Dutch fleet that left Rotterdam in 1598. This small craft, called the Good News, of 150 tons, discovered the South Shetland Islands, rediscovered by Captain Smith, of Blythe, in 1818.

In 1645, La Rocke, a French navigator, discovered South Georgia. On his return he discovered an island, which he named Isle Grande, in latitude 45deg. south, longitude 31deg. 21min. west, which was searched for in vain by Captain Colnett in H.M.S. Rattler in 1793, who only found discoloured water with debris floating about.

Here a strange question presents itself. Had this island of La Rocke's suddenly gone down? A catastrophe not at all improbable when we come to consider the mighty forces of earthquakes that have changed the faces of the earth at comparatively recent times.

In 1793 Captain Cook crossed the Antarctic Circle in long. 39.35deg. E., but was stopped by the icy cliffs, and compelled to return. In 1823 Captain Waddell penetrated through loose ice, and found an open sea in lat. 74deg. and long. 35deg. W. Admiral De Urville sighted Joinville Land, and named Louis Phillip Island, in 1838

In 1839 the British Admiralty sent Captains Ross and Crozier, both of Arctic renown, in the ships Erebus and Terror, on a voyage to the South Pole. They visited Kerguelan Island, and here great changes had taken place. Scarcely a green blade of grass was to be seen, while entombed in volcanic debris fossil remains of coniferous trees were found, and large lodes of coal were found near the shores of Christmas Harbour, which Captain Ross recommended to the notice of the Government.

This find suggests a once milder climate and great physical changes since the deposition of this vegetable product.

In December of 1840 they were in lat. 70deg., long. 175deg. E., in a sea free of ice. On 11th January, 1841, they discovered and named Victoria Land. Landing on an island lying off the coast, they called it Possession Island. From here they stood to the southward, when perhaps one of the grandest sights ever witnessed was presented to them—a mountain peak, reaching an altitude of nearly 13,000ft., belching forth volumes of smoke, intermingled with flashes of red flame, while down the side of this mountain great glaciers hung, like jewels around Titan's neck, to be flung

off when his fiery work began, and float away in immense ice islands. Then when the great Fire God rested, the ice would accumu'ate, to be again thrown aside by the waking god. Near this huge volcano was an extinct crater, whose altitude was but little short of the other, and to them he gave the name of his ships.

The geographical position of these mountains being lat. 77deg. 31min. south, long. 167deg. 1min. east. Continuing a southerly course from here they succeeded in reaching lat. 78deg. 3min. south, long. 173deg. west, when they were beset with the ice cliffs, and had to return. While passing along this ice-barrier, soundings were obtained in from 200 to 300 fathoms, green mud and clay.

Returning, they stood to the north-west, fol'owing the land until it was lost in the ice-barriers in the direction of the land seen by Commodore Wilkes, of U.S.A. expedition. During the summer months of 1841 and 1842 attempts were made to push to the south, when they succeeded in reaching lat. 77deg. 49min. south, long. 162deg. 35min. west, without seeing land, when they were again beset with the ice-barrier.

On 6th January, 1843, Captains Ross and Crozier landed and took possession of Pyrmedul Island, 2760ft. high, in lat. 63deg. 36min., long. 54deg. west.

Towards the end of the season they reached lat. 71deg. 30min. south, long. 15deg. west, but were again driven back. To Sir James Ross we are indebted for much valuable scientific information. He succeeded in locating the South Magnetic Po'e, reaching within 160 miles of the place with the ships. The mean temperature both of air and sea water south of 63deg. is even in summer below freezing point. Between lat. 60deg. and 63deg. there is a rise, 38 Fahr. being recorded during the month of March. It is remarkable that the bottom temperature in lat. 50deg. is little different from that of the Indian Ocean at the same depth.

The mean barometrical pressure within the Antarctic circle is normally under 29in.

The depth is found to decrease as the Pole is approached, and the Challenger dredged up granitic particles and mica schists, sandstones, and other continental rocks.

As ear'y as 1830 Messrs. Enderby carried on whale fishing in high south latitudes, and discovered land in lat. 66deg., named after the firm. The expedition of the Challenger only confirmed the reports of former navigators. In 1892 several Dundee whalers left for the South Seas on the report of Captain Ross finding the right whale in great numbers, but they were not fortunate in seeing any. Some few years ago, a Mr. Bull, a Norwegian gentleman living in Melbourne, succeeded in enlisting the interests of Commander Foyn, we'l and honourably known in whaling circles. The result of a personal interview led to the small screw steamer Antarctic, fully equipped at the expense of Commander Foyn, with

orders to penetrate to the high South latitudes, in search of the right whale.

After two fruitless attempts they succeeded in reaching Victoria Land, and landed on Possession Island, discovered by Captain Ross.

Captain Kristenson and Mr. Bull estimated the loose ice-belt to be about 150 miles round. They reached as far as lat. 74deg., and, not seeing any of the right whale, they returned to Melbourne. Some time after the return of the Antarctic to Europe, Mr. Bull published an interesting account of the expedition, and although he lays no claim to any great scientific results, yet the voyage of the Antarctic has paved the way for further undertakings. At the present time a small vessel called the Southern Cross is on her way to high South latitudes, but as she is equipped by the proprietor of a popular paper and the champion of De Rougemont, we are not sure whether it is not intended as a huge joke, and although we may not expect to hear of the thrilling adventures of them riding on turtles and seals, yet the leader, who is not a stranger to Queensland, will not be wanting in the supply of copy. A perusal of Mr. Bull's narrative does not recommend the leader to further note.

In a review of all the expeditions where high efficiency and discipline is absolutely necessary, nothing short of one of our vessels of the Royal Navy can hope for success. True, the Fram is an exception, but she was an unexceptional case, and the outcome of the experiences in Arctic regions of many years. It is to be hoped that ere long the Admiralty will send out a well-found vessel with power to steam through the ice-belt and be able to penetrate the ice and snow beyond Mounts Erebus and Terror.

A measurement of the degree of longitude on the parallel of 80deg. will be fraught with great interest, and may confirm the suspicion of Humbolt in the oblate figure of the earth in the high South latitudes, and account for the peculiarly low barometer in that quarter. Of the mineral wealth, who can say what may be hidden, and yet within reach? There was a time in the world's history when that valuable and scarce mineral, aluminum, was much more plentiful, and it is not improbable that lodes of this may be found, when a revolution in the iron trade would ensue that would exceed by far the change from wood ship-building to that of iron.

The beds of guano seen by Captain Ross on Possession Island would be of great commercial value, being no doubt rich in phosphates. In this age of invention, we may be able to establish an automatic meteorological observatory, transmitting the information independent of cable, to some station in Australia, or Tasmania, thereby extending the horizon of observation, and assisting in the weather forecasts. It remains now to be seen at which point the great South land will be most easily entered. From the experience of all former expeditions, a sea front of ice beyond 74deg. has been found.

As this ice-belt on the meridian of Victoria Land passed through by Ross is very narrow, and when open would only be a day's steaming, it might not be considered worth while to establish winter quarters in the vicinity of Possession Island, although, no doubt, it will be attempted; for all our knowledge of Antarctic climate is with the months of December, January, and February, and a record of the other nine months might give a data to go upon for future voyages. It is possible that the proximity to Mount Erebus would have an influence on the climate, and assist the explorer in pushing southwards. It now behoves the Australian, who will more directly benefit by any of the results of an Antarctic expedition, to respond to the call of a well-accredited scheme for the further extension of knowledge in the Antarctic regions.

In closing this short paper, I take the opportunity of thanking Captain Eaton for information afforded me in reference to the older navigators, and Mr. R. M. Collins for the perusal of books on the subject.

Mr. Kendall Broadbent exhibited some very beautiful specimens of Game Birds, and alluded to their geographical range.

The Hon. Secretary, Mr. J. P. Thomson, exhibited a new type of a position filar micrometer, which had been made to his order in London, for his own equatorially-mounted astronomical telescope. This micrometer has a position circle, mounted on body, divided on silver, reading by a vernier and microscope, and moved by a wheel and pinion motion. The head of the filar micrometer is also divided on silver, reading to 1/5000th of an inch, and electrical illuminating apparatus for giving bright lines on a dark field, thus overcoming a very great difficulty in illumination, where very faint and minute objects have to be measured and observed. Mr. Thomson explained the use of this beautiful instrument, and stated that he had taken up the work of double star measurement, lunar features, the markings on the surface of the larger planets, and such other astronomical objects as require the use of a micrometer of the kind exhibited. In this connection it may be stated that Professor James S. Stevens had recently conducted an elaborate "study of various styles of cross-wires" used in telescopic instruments, with results which showed that, with one exception, the method of intersecting wires is found to give by far the largest probable error, and may easily be classed as the poorest method.

MAY 30th, 1899.

The Vice-President, Staff Veterinary Surgeon James Irving, M.R.C.V.S.L., in the chair.

The minutes of the previous monthly meeting were read by the Hon. Secretary (Mr. J. P. Thomson), and duly confirmed.

Mr. Thomson alluded to a private note which he had received from Sir H. W. Norman, in which the late Governor expressed his deep interest in

the welfare of the Society and appreciation of its useful work. Sir Henry and Lady Norman had been exceedingly sorry to hear of Mr. Thomson's recent illness, and a hope was warmly expressed that he would long ago have completely and permanently recovered.

The death was announced of the distinguished director of the Central Meteorological Observatory, Mexico, and of the secretary of the Tyneside Geographical Society, England.

Mr. Robert Mackie was elected a member of the Society.

Messrs. W. G. Cox, C.E., and W. L. Crompton, L.S., were appointed to undertake the work of clearing up the arrears in the library, the cataloguing and arranging of which had got very much behind. These gentlemen laid on the table a large number of donations and exchanges.

Mr. W. G. Cox read an interesting paper by Mr. R. H. Mathews on "Rock Carvings of the Australian Aborigines," with illustrations.

The Hon. Secretary (Mr. J. P. Thomson) then read a paper prepared by him on "The Geographical Conditions of City Life."

Alderman W. Jones thought that Mr. Thomson had rendered a distinct public service by bringing this matter forward in his very valuable paper. The subject was a vitally important one, and concerned every citizen. There was no doubt whatever that promenades and recreation reserves were greatly needed in Brisbane, and the matter ought to be taken in hand by the proper authorities.

Mr. W. G. Cox concurred in Mr. Jones's remarks, and thought that a promenade ought to be laid out along the North Quay, as well as the Domain and Gardens.

Mr. W. L. Crompton also joined in the discussion, and thought that promenades were a necessity. Unfortunately they did not exist in Brisbane.

Mr. Rogers, City Engineer, complimented Mr. Thomson on his excellent paper, with which he almost entirely concurred. He hoped the City Council would take action in the matter.

It was resolved by the meeting that a copy of the paper should be prepared and sent to the Mayor of Brisbane.

The Vice-President agreed with the previous speakers, and thought a drive ought to be made around Victoria Park.

JUNE 30th, 1899.

Mr. D. S. THISTLETHWAYTE, C.E., in the chair.

The minutes of the previous monthly meeting were read by the Hon. Secretary, Mr. J. P. Thomson, and duly confirmed.

The HON. SECRETARY read a paper prepared by a Committee of the Council of the Society, entitled "Some Critical Notes on the Queensland Volume of the International Catalogue of Scientific Literature."

On the motion of Mr. ROBERT FRASER, seconded by the Chairman, it was resolved to print the paper *in extenso*, and send copies of it to the International Catalogue Council in London, and to kindred societies in other parts of the world.

ANNUAL GENERAL MEETING.

AUGUST 5th, 1899.

The Annual General Meeting and Conversazione was held on the above date at the new rooms of the Society, Johnsonian Buildings, Elizabeth Street, Brisbane.

The first part of the proceedings from 7.30 to 8 o'clock p.m. took the form of a reception by the President elect (Right Hon. Sir Hugh M. Nelson) and Officers and Council of the Society.

The Vice-President (Staff Veterinary Surgeon JAMES IRVING, M.R.C.V.S.L., F.R.G.S.A. (Q.) presided over the business part of the meeting in the absence of Mr. R. M. Collins, the retiring President, who was absent in Great Britain.

The attendance was very large and representative, the room being packed full. The meeting was graced by the presence of His Excellency Lord Lamington, and had it been possible, Lady Lamington would have attended also. Among others, there were present Hon. A. C. Gregory, Bishop Webber, Mr. T. Macdonald-Paterson, M.L.A., Dr. D. Hardie (president Medical Society), Dr. A. J. Turner (secretary Medical Society), Mr. J. W. Sutton (president Royal Society), The Chevalier D. O'Donovan, C.M.G., Mr. C. Blake (Registrar Pharmacy Board), Captain Townley, Captain Pennefather, Mr. A. B. Brady, Mr. Badger, Mr. L. Barnett (Italian Consul), Messrs. W. Jones, A. Muir, A. Stuart, the Acting German Consul, Mr. R. Fraser, Alderman Seal (Mayor), Mr. Robert Mackie (Chinchilla), Mr. James Allan, Mr. J. H. M'Connel, Major Aytoun, and Mr. J. P. Thomson (Hon. Secretary). Among the ladies were Lady Nelson, Mrs. Macdonald-Paterson, Mrs. Hardie, Mrs. Jones, Mrs. Muir, Mrs. Walker, Mrs. J. P. Thomson, Mrs. J. W. Sutton.

On the motion of the Hon. Secretary, seconded by Mr. W. Jones, the minutes of the preceding monthly meeting of the Society were taken as read, confirmed, and signed by the Chairman.

The following new members were elected: Messrs. James F. Brier, Robert Queale, John Gilligan, and W. G. Henderson.

The Hon. Treasurer (Mr. Alex. Muir) submitted his financial statement. The Hon. Secretary read the following official summary of the work of the session:—

THE ROYAL GEOGRAPHICAL SOCIETY OF AUSTRALASIA, QUEENSLAND.

REPORT OF COUNCIL.

Fourteenth Session, 1898-1899

The Council has the honour of submitting to the Fellows and Members the following report on the operations of the Society during the preceding session :—

Membership.—The roll of 139 fellows and members at the close of last financial year has been diminished by the death of one of the most widely respected and talented native born men of Queensland. In thus alluding to the late Mr. T. J. Byrnes, we greatly deplore the loss of a most valuable member from our very front ranks, and one who had, moreover, been called upon to fill the highest office of the State. Conjointly with our distinguished and greatly esteemed President-elect, Right Hon. Sir H. M. Nelson, Mr. Byrnes was appointed to represent our Society in Great Britain, at the time of the Diamond Jubilee celebrations there, about two years ago. We have also to allude, with deep regret, to the death of Mr. William Bell, who was one of our greatly valued foundation members, and to the early demise of Mr. Bertrand Roberts, who had been for some years stationed at Pahang in the Malay Peninsula, but who, at the time of his death, was on a holiday trip to the old country. Mr. Roberts had been for some years on our list of active members, and was one of the most appreciated contributors to the literary archives of our Society. The Honorary Membership's Roll has been strengthened by the election of His Highness Prince Rolland Bonaparte, of Paris, who is an able and widely known worker in the field of our activity, and who had expressed a very strong wish to join our Society. The number of our Hon. Corresponding Members has been increased by the appointment of his Excellency the Hon. G. R. Le Hunte, who has succeeded one of our Honorary Fellows (Sir Wm. MacGregor) in the governorship of British New Guinea. Mr. Le Hunte has seen a good deal of active official life in the more remote parts of the British Empire, and has travelled much in the greatly animated regions of the Western Pacific, including an interesting journey to the Caroline Islands amongst the cyclopean ruins there. In these two honorary, and an additional five active members elected during the session, the ramifications of the Society have been extended, and its influence increased.

Diploma of Fellowship.—The Council has approved the applications of Messrs. Robert Fraser, of Brisbane, and T. B. Moore, of Tasmania, for the Society's Diploma of Fellowship, and recommends that the same be conferred upon these greatly valued members, subject to the usual conditions.

THE HONORARY TREASURER IN ACCOUNT WITH THE ROYAL GEOGRAPHICAL SOCIETY OF AUSTRALASIA, QUEENSLAND

For the Year ended June 30th, 1899.

Dr.

	£	s.	d.	£	s.	d.
1898.						
July 1.—To Balances:—						
Govt. Savings Bank ..	57	10	10			
Royal Bank	8	19	5			
				66	10	3
1898-9.						
July 1—To Subscriptions, Entrance and Life Membership Fees	73	8	0			
" Interest on Savings Bank Deposit	1	14	2			
				75	2	2
				£141	12	5
1899.						
June 30—To Balances, viz.—						
Govt. Savings Bank ..	59	5	0			
Royal Bank	0	14	3			
				£59	19	3

Cr.

	£	s.	d.	£	s.	d.
1898-9.						
By Advertising and Name plate ...	1	7	6			
" United Service Institute ..	7	10	0			
" Expenses, meetings	3	15	0			
" Library—shelving and subscription to "Nature" ..	4	17	4			
" Postage, telegrams, etc. ..	1	2	0			
" Printing Proceedings, post cards, etc.	49	17	9			
" Clerical Assistance to Hon. Secretary	12	7	0			
" Bank Exchange and Charges	0	16	7			
				81	13	2
" Balances—						
In Govt. Savings Bank, June 30th, 1899				59	5	0
In Royal Bank, June 30th, 1899				0	14	3
				£141	12	5

Examined with Bank Pass Books, Vouchers, etc., and found correct.

C. W. de VIS, *Hon. Auditor.*

Brisbane, *July 13th, 1899.*

ALEX. MUIR, *Hon. Treasurer.*

FUNDS.—The Hon. Treasurer's financial statement as above summarises the receipts and expenditure during the year just ended, on the 30th June last. As usual, all liabilities have been fully discharged, and the Society enters upon the work of the fifteenth session free of encumbrance. The Council has all along recognised that owing to limited income there has been no opportunity of expanding the operations of the Society in such respects as have seemed from time to time most desirable. This has had the effect of limiting the publications of the Society to the issue of an annual volume of "Proceedings and Transactions," instead of quarterly issues as in the earlier years of the Society's career of usefulness. In the first half of the year 1897 a letter was addressed by the then President to the Prime Minister, in which the claims of the Society were urged upon the Government for consideration and material support. This communication elicited a reply to the effect that the question of an annual grant to the Society would be considered when the Estimates for that year were being prepared. Nothing further was, however, done in the matter until a few months ago, when a deputation of the Council waited on the Chief Secretary to ask the Government for house accommodation in consequence of the site formerly occupied by the Society being required for new Lands and Survey Offices. On this occasion the subject of a money grant was alluded to, and Mr. Dickson promised to give the matter consideration. As a result, the Council is happy to state that the Society has the promise of a grant of £50, and an annual endowment of £1 for every £1 raised by members' subscriptions up to £100.

PUBLICATIONS.—In consequence of the Hon. Secretary's illness some delay occurred in the issue of the thirteenth volume of "Proceedings and Transactions," which was only sent out from the printers at the end of 1898. This volume, like its predecessors, has been mailed to kindred institutions, public libraries, and Government departments all the world over. The continuous and growing foreign demand for the current and back numbers of the Society's publication is a matter to which the Council has often to give a good deal of attention. Whilst this world-wide appreciation of our literature may reasonably be regarded in the light of satisfactory evidence of the value of our local work it is certain that it entails additional obligations, which cannot always be readily met. It is quite of common occurrence to receive applications from all parts of the world for extra copies of our earlier volumes, and these have now become so scarce that they cannot always be supplied.

LIBRARY.—This important department of the Society continues to grow very rapidly. Every week brings something new in the shape of exchanges or donations, with the result that our shelve space is taxed to its utmost capacity, and more accommodation in this respect is greatly needed. Our new quarters have supplied extended wall space for some of our larger maps and charts, but even this is quite inadequate for present

requirement, to say nothing of future needs, as many of our most valuable maps and diagrams have to be rolled up and stowed away for want of space.

Very few people realise that in the rooms of the Society is deposited the most complete and extensive geographical library in the colony—a mass of publications representing the geographical and other scientific literature of the world, besides the most recent developments in the department of cartography. The work of arranging and cataloguing the library has met with some difficulties. These it is hoped have now been overcome for a time at least. A short time ago the duty of clearing up the greatly accumulated arrears in the library was kindly undertaken by two of our much valued members (Messrs. W. G. Cox and W. L. Crompton), and these gentlemen have happily succeeded in listing everything up-to-date, and putting the book shelves into order in our new quarters. A proper catalogue is what is now much needed, and the compilation of such a work will receive the consideration of the new Council in the beginning of the ensuing session.

New Premises.—Our present accommodation has considerately been provided by the liberality of the Queensland Government, as represented by the Department of Public Works. There are two rooms placed entirely at our disposal by the Government, one occupied by the library and the Hon. Secretary's office, in which the Council Meetings are held; the other being used for general purposes. The large meetings of the Society will be held in a commodious room occupied jointly by the Pharmacy Board and the Medical Society of Queensland, these bodies being co-tenants with ourselves in occupation of the whole of the premises.

It is recommended that the Hon. A. C. Gregory, C.M.G., be appointed an Honorary Member of the Council and Referee, in consideration of the eminent services which he has rendered to geographical science in the field of Australian exploration and discovery, and as a mark of appreciation of his long services to the Society, in the capacity of its first President, and afterwards on the Council.

In accordance with a resolution of the Council, carried at a meeting held on January 19th, of the current year, it is recommended that the word "Branch" be left out of the title of the Society altogether, and that hereafter the Society be designated "The Royal Geographical Society of Australasia, Queensland."

The Council, in conclusion, is desirous of offering its congratulations to the fellows and members upon the continuous steady development of the Society and the expansive nature of its relations with the kindred institutions of the world.

For the Council,

J. P. THOMSON,

Hon. Secretary.

August 5th, 1899.

On the motion of the Hon. Secretary, seconded by Mr. R. Fraser, the Council's report and the Hon. Treasurer's statement of accounts, were unanimously adopted.

The Officers and Council for the ensuing session were elected as follows:—Patron, His Excellency the Governor; President, Sir H. M. Nelson, P.C., K.C.M.G., D.C.L.; Vice-President, Mr. W. Jones, J.P.; Hon. Treasurer, Mr. D. S. Thistlethwayte, C.E.; Hon. Secretary, Mr. J. P. Thomson, Hon.F.R.S.G.S.; other members of the Council, Hon. W. Allan, M.L.C., Major J. Irving, M.R.C.V.S.L., Messrs. C. B. Lethem, C.E., A. Muir, J.P., R. M. Collins, J.P., R. Fraser, J.P., C. W. De Vis, M.A., and R. Gailey, J.P; Hon. Auditor, Mr. C. W. De Vis., M.A.

The newly elected President then took the chair, and delivered the Anniversary Address.

His Excellency Lord Lamington moved a vote of thanks to Sir Hugh Nelson for his interesting address. He also included in the motion the proposal to print the address. This was seconded by the Hon. Secretary, and carried by acclamation.

The President returned thanks.

The company then adjourned to an adjoining room, where refreshments were served. The catering was most successfully carried out by Mrs. J. P. Thomson and Mrs. Alexander Muir, and these ladies were actively engaged in making the numerous members and their friends comfortable. Shortly afterwards the pleasant evening was brought to a conclusion.

The Royal Geographical Society of Australasia,

QUEENSLAND.

DIPLOMAS OF FELLOWSHIP.

(*See resolution on page 3 of cover*).

The following gentlemen have been awarded the Diploma of Fellowship:—

Honorary:

His Excellency Sir William MacGregor, K.C.M.G., C.B., M.D., D.Sc., Hon. F.R.S.G.S., etc.

Hon. A. C. Gregory, C.M.G., F.R.G.S., M.L.C., etc.

His Excellency The Right Hon. Lord Lamington, K.C.M.G., B.A., F.R.G.S., Hon. F.R.S.G.S., etc.

(*b*) On *Application*:—

Veterinary Major James Irving, P.V.O., Q.D.F., M.R.C.V.S.L.

J. A. Baxendell, Esq.

William Jones, Esq., J.P.

Charles Battersby, Esq., J.P.

Robert Fraser, Esq., J.P.

LIST OF MEMBERS.

(P) Members who have contributed papers which are published in the Society's "Proceediugs and Transactions." The numerals indicate the number of such contributions.

(PP) Past President.

A dagger (†) prefixed to a name indicates a member of the Council.

Life members are distinguished thus (*).

Should any error or omission be found in this list, it is requested that notice thereof be given to the Hon. Secretary.

Foundation Members:

Atkinson, James R., J.P., Lic. Sur., Ipswich, Queensland.

Daniell, E. N., Survey Department, Brisbane.

†Gailey, R., J.P., Courier Building, Brisbane
P7PP†Gregory, Hon. A. C., C.M.G., F.R.G.S., M.L.C., &c., Mary Street, Brisbane.
Marks, Hon. C. F., M.D., M.L.C., Wickham Terrace, Brisbane.
P1 *Moor, T. B., F.R.G.S., F.R.S. Tas., Strahan, West Coast, Tasmania.
P1†Muir, A., J.P., Queen Street, Brisbane.
P27PP †Thomson, J.P., Hon.F.R.S.G.S., etc., Hon. Secretary, "Alsatia," Dornoch Terrace, South Brisbane.

Members:

Ahern, John, L.S., Charters Towers, Queensland.
Aldridge, H. E., J.P., "Baddow," Maryborough, Queens'and.
P1PP †Allan, Hon. W., F.R.G.S., M.L.C., "Braeside," Dalveen, Queensland.
Allan, James, J.P., Messrs. Allan and Stark, Queen Street, Brisbane.
Almond, T. M., F.R.A.S., Marine Department, Brisbane.
Anning, John, J.P., Charlotte Plains, Queensland.
Bartholomew, T., J.P., Woombye, North Coast Line, Queensland.
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